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ABSTRACT

This paper presents a study attempting to identify and evaluate high school activities that impact instrumental student outcome. High school music activities and their impact on student instrumental outcome from a variety of perspectives were examined. There is a subtle difference between musical independence and musical achievement. Musical achievement represents the mastery of any academic skill related to music, but musical independence is related directly to the actual production and performance of music. The link between knowledge acquisition and knowledge use on performance is the key. Music knowledge may exist without musical independence, but musical independence may not exist without music knowledge. The research at the secondary level on musical independence found identifiable and measurable significant differences between students and programs identified as average and as outstanding instrumental music programs. The student portion of the project noted a positive relationship between high school music activities such as marching contests, concert festival, solo ensemble, solos, other ensembles, and such activities, and the student's musical independence. The band director segment examined the grading procedures that influence students' musicianship and the relationships that exist among demographic data and the band directors' and students' musical independence. Student musical independence and high school activities that impacted it were studied from the postsecondary perspective as well. The findings indicated that participation in all-state band, solo ensemble, concert festival, private lessons, and church or community choir had a positive impact on the students musical independence. The survey instrument is attached. Contains 14 references. (Author/DK)

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# THE RELATIONSHIP BETWEEN HIGH SCHOOL MUSIC ACTIVITIES AND THE COLLEGE STUDENT'S MUSICAL INDEPENDENCE

**(How musically important are all-state band, concert festival, private lessons, marching contests, etc.?)**

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**(How musically important are all-state band, concert festival, private lessons, marching contests, etc.?)**

## I. BACKGROUND

This paper represents the latest in a series of studies attempting to identify and evaluate high school activities that impact instrumental student outcome. The authors have examined high school music activities and their impact on student instrumental outcome from a variety of perspectives. Little information is available in the ERIC data base, research journals, or in music education textbooks regarding the value of state-sponsored music activities (i.e., *all-state band, all-state orchestra, all-state jazz band, all-state choir, solo-ensemble*), how students are graded during these activities, and how judges are selected. There is little relevant research evaluating other music activities such as *church/community choir, community band, marching contests,* and *private lessons*, or examining the level of impact each activity has on the student's instrumental musical growth. The authors noted that "predictor variables" (an ERIC identifier) regarding instrumental musical excellence have not been identified or thoroughly examined, nor have standards been developed or expectations defined (Bobbett, 1982).

The authors make a subtle difference between **musical independence** (MI) and **musical achievement**. Musical achievement represents the mastery of any academic skill related to music, but MI is directly related to the actual production and performance of music. The link between knowledge acquisition and knowledge use on performance is the key; music knowledge may exist without MI, but MI may not exist without music knowledge.

In the authors' secondary (*i.e., 9th or 10th grade through 12th grade*) MI research, the findings indicated identifiable and measurable (significant) differences between students and programs identified as average (randomly selected) and as outstanding (nominated) instrumental music programs (Bobbett, 1987a and 1987b). Other research examined students and band directors participating in "good" Appalachian high school instrumental programs. The student portion of the project noted a positive relationship between high school music activities such as marching contests, concert festival, solo-ensemble, solos, other ensembles, etc., and the student's MI (Bobbett, 1991a). The band director segment examined the grading procedures that influence student's musicianship and the relationships that exist between demographic data and band directors' and students' MI (Bobbett, and Bobbett, 1990b).

Student MI and high school activities that impacted MI were studied from the postsecondary perspective as well. When the students participating in the University of Tennessee band were evaluated (Bobbett, 1989, 1990a), the findings indicated that participation in *all-state band, solo-ensemble, concert festival, private lessons*, and *church/community choir* had a positive impact on the student's MI. The authors expanded the early postsecondary research and examined the students participating in the three instrumental ensembles at Ball State University (Bobbett,

1991b, 1992). The findings suggested positive links between high school activities such as *all-state band, concert festival, solo-ensemble, private lessons*, and student/program MI.

New research was needed to expand on the earlier MI research; prior research could be strengthened if additional research criteria were added. First, all possible music activities that were available to the instrumental high school students needed to be fully examined. Second, researchers needed to quantify each activity's impact on MI. Third, researchers needed systematically to organize and group instrumental activities (a factor analysis issue if not done a priori by logic). Fourth, the project needed a large number of participants, preferably chosen from more than one postsecondary school. The instrumental students (n=354) participating at Florida State University (n=136), Wichita State University(n=91), and Ball State University (n=127) agreed to participate in this new research project.

Earlier studies used Colwell's Musical Achievement Test #3 (MAT3), and found it to be a useful tool for evaluating musical outcomes. The current study compares the results from Colwell's Musical Achievement Test #4 (MAT4) with results from MAT3.

Two earlier portions of this study [(1) demographics and MI, and (2) college courses and MI] have been reported at several educational associations (Bobbett, Dorothy, and Bobbett, 1992b, 1992c, 1992d, 1992e). The third segment of this project, reported below, examines and compares the student's high school academic profile and instrumental activities with the student's MI.

## II. HIGH SCHOOL INSTRUMENTAL MUSIC ACTIVITIES–AN OVERVIEW

High school instrumental music students participate in a variety of music activities and most high school band directors encouraged this participation. In all-state band, solo-ensemble, all-state orchestra, all-state choir, and all-state jazz band, students have the option of whether or not to participate, but registration guidelines require the director to give written permission. Some state activities are more selective than others regarding student participation. For example, of the total number of students auditioning for all-state band, all-state orchestra, all-state choir, or all-state jazz band, only a very small percentage (≈5% to 15%) of the students that audition are accepted to participate in these state activities. In addition, in some states, to participate in all-state orchestra or all-state jazz band, students have to qualify first for all-state band, and only these students would be allowed to audition for these music activities. In concert festival, the band director makes the decision whether or not the high school band participates. Because of a variety of reasons such as the band's musical maturity, financial considerations (*i.e., transportation for a 100 member band to make a 200 round trip for a 15 minute activity might not be considered educationally cost-effective*), the director's educational philosophy regarding music competitions, or the director's competency, most secondary bands do not participate in concert festival. But participation in church/community choir, community band, and private lessons is the students' and their families' decision. Here, students have to provide their own financing and transportation. Also, marching contests

and high school jazz band are school-sponsored activities, and in most instances, the director determines whether or not the students participate.

Most state and local educational establishments encourage high school instrumental students to participate in these activities. Secondary principals and local school boards provide band directors and their students release time to attend "state" music activities, plus provide supplementary funds to pay travel expenses. Students earn awards (*certificates and/or medals reflecting the state seal*) that imply state sponsorship. Activities are usually held at state-owned facilities such as the local high school or university. All-state band (ASB) is a popular state-sponsored activity for outstanding instrumentalists. Students audition and are usually required to perform a prepared solo/etude to demonstrate their musical skills; scales, thirds, and arpeggios to demonstrate their musical fundamentals; sight-reading to demonstrate their ability to master a new musical composition in a short period of time. Understanding of music terms and symbols is demonstrated in the performances.

After students are selected to participate in all-state band, they may have the opportunity to participate in auxiliary music activities such as all-state orchestra (ASO) or all-state jazz band (ASJB). If scheduling permits, they might even participate in all three state activities. Choir and band are usually in different departments. High school choir members may participate in all-state choir (ASC) (*similar to band students participating in all-state band*). Some high school musicians participate in both choir and band. If high school musicians are interested in vocal music, they might also participate in the local church/community choir.

Private lessons (PL) are an important part of the instrumental student's musical training. Private teachers are typically able to provide more specialized and in-depth instruction than can be addressed in a full band setting. Band directors often encourage private lessons. Students may need private lessons to get accepted into all-state band. Private instrumental teachers teach the higher-level musical skills associated with musicianship, which may be neglected in the typical classroom setting. The solos that the private teacher teaches can be used for the student's training and preparation of solo-ensemble--another state music activity. When students attend solo-ensemble (SE), they are evaluated and graded by either one judge or a panel of judges.

Throughout the year, instrumental music students have several options to perform in a large instrumental ensemble. A student might participate in marching contests (MC) in the fall or participate in Concert Festival (CF) in the spring. For Concert Festival, the band usually prepares several concert pieces, a march, and a possible warm-up selection and is graded on the band's performance. Students might elect to participate in the local community band, performing concerts throughout the year. High school instrumental music is a year-round activity, and instrumental students have the option to participate in as few or as many activities as they desire.

Preparation for music activities is different from student preparation for most other academic activities. Music activities such as ASB, ASO, ASJB, SE, CF, and MC require the student to prepare a minimum of 1-3 months in

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advance just to participate. For example, if a student plans to prepare for ASB, the student and teacher (private teacher and band director) need to plan, prepare and work throughout the year. To participate in MC, the student practices throughout the late summer and fall; to participate in SE and CF, the student practices throughout the school year. Therefore, students participating in most music activities make a long-range commitment in terms of daily practicing just to succeed. In academic courses such as math, science, or English, a term paper, project, or report might be the only comparable academic activity requiring a long-term commitment and daily preparation. Other academic activities require only daily, or at most weekly preparation. A second difference is that most music activities are graded by an external panel of experts, and therefore not subject to community or local school standards.

Students can participate in some music activities more years than in other activities. One student might start private lessons prior to the attending the first grade, another student might start in middle school, while another might start taking private lessons in high school. In some of the small secondary band programs, it is not uncommon for middle school students to be allowed to participate with the high school students in concert festival or marching contests. In some states, there are no guidelines for a minimum grade level to participate in junior high school all-state band. A gifted 4th, 5th, or 6th grader instrumentalist might be better than any 8th or 9th graders in the state and therefore be allowed to qualify and participate in junior all-state band/orchestra. Participation in community band might be another example where an elementary or middle school student might participate in this music activity at an early age.

## III. PURPOSES

The first purpose of this study is to examine the relationships between students' high school academic profile (i.e., high school grade point average, SAT score, etc.) and their MI as measured by scores on Colwell's MAT3 and MAT4. The second purpose is to examine the relative impact that 11 high school music activities have on the students' MI development. The third purpose is to examine the student's opinions regarding the importance of the high school music activities and the student's MI. The fourth purpose is to examine the impact each high school music activity (*independent variable*) has on MI (*dependent variable*).

## IV. TESTS AND QUESTIONNAIRES

The Instrumental College Survey-2 (ICS-2) (see Appendix A), Colwell's Music Achievement Test 3 (MAT3), and Colwell's Music Achievement Test 4 (MAT4) were administered to 354 instrumentalists participating in Ball State University, Florida State University, and Wichita State University bands.

Colwell's MAT3 and MAT4 were used to evaluate the musical independence of the following instrumental programs:

| | Ball State University | Florida St. University | Wichita St. University |
|---|---|---|---|
| **Top** | Wind Ensemble | Wind Ensemble | Wind Ensemble |
| **Middle** | Symphonic Band | Symphonic Band | Concert Band |
| **Bottom** | University Band | Concert Band | N/A |

These ensembles have different missions. The wind ensembles are the top (elite) performing ensembles at each institution. The middle ensembles, comprised of top and average instrumentalists, serve as training organizations, while the bottom ensembles are primarily recreational. To be admitted to an ensemble, the students are evaluated by an audition process; faculty members listen and evaluate each student's playing skills. The better instrumentalists are selected to perform in the top ensemble.

The three high school areas in the ICS-2 are as follows:

1. **High School Academic** questions sought information regarding each student's high school Grade Point Average (GPA), ACT score, and SAT score. In addition, the students were asked to identify and describe activities that excellent high school musicians emphasize.

2. **High School Activities and Years of Participation.** Students indicated the number of years they participated in 11 high school music activities. The 11 activities included: all-state band (ASB), all-state orchestra (ASO), all-state jazz band (ASJB), all-state choir (ASC), concert festival (CF), solo-ensemble (SE), marching contests (MC), private lessons (PL), church/community choir (CCC), high school jazz band (HSJB), and community band (CB).

3. **Perceptions.** Using a 5-point Likert-type scale, the students evaluated the importance of each of the 11 high school activities in developing musicianship.

**Colwell's Music Achievement Test 3 (MAT3) and Music Achievement Test 4 (MAT4).** The researchers used Richard Colwell's (1970) MAT3 and MAT4 to evaluate the musical independence (MI) of instrumental students participating in the top, middle, and bottom bands at Ball State University, Florida State University, and Wichita State University. MAT3 was selected for this research because the standardization information provided in the Interpretive Manual and the Administrative and Scoring Manual is adequate and the answer sheets are clear, self-explanatory, and easy to grade. Further, it best evaluates the student's musical independence (Bobbett, 1987) and has previously determined reliability estimates. Colwell's MAT4 was selected because it addresses, more directly, some of the concepts of music history and music theory generally covered in the undergraduate music curriculum. Colwell (1970)

used the Kuder Richardson 21 (KR21) to evaluate the internal consistency of MAT3 and MAT4 for grades 9-12. The KR 21 ranged from .87 to .89 for MAT3 and from .84 to .89 for MAT4. The MAT 3 consists of four subtests:

1. Tonal Memory (e.g., MAT3, subtest #1 [3ST1]): (20 items) A chord is played on a piano first in block form, and then arpeggiated. The subject determines which tone of the arpeggiated version (four tones) changed. If the two chords are identical, the subject fills in the blank marked "O." Colwell defines this as "the ability to retain the quality of a chord" (p. 100).

2. Melody Recognition (3ST2): (20 items) A melody is first played on a piano and afterward it is placed in a three-part setting. The subject determines whether the original melody is in the high "H," middle"M," or lower "L" voice. If the subject is in doubt or fails to hear the melody, he fills in the blank marked "?" Colwell defines this as "the ability to follow a melody aurally" (p. 102).

3. Pitch Recognition (3ST3): (20 items) The subject hears the first tone of two written pitches, and afterward hears three additional pitches. The subject indicates which of the three pitches matches the second written pitch. Colwell defines this as "the ability to mentally hear the pitches seen on a page of music" (p. 104).

4. Instrument Recognition (3ST4): (15 items)
   Subtest A: (10 items) After listening to a melody played on a particular instrument, the subject identifies, from the four possible choices, the correct instrument. If the four instrument choices do not match the instrument heard, the subject fills in the blank marked "O." Colwell defines this as "the ability to identify solo instruments . . . from an aural example" (p. 106-7).

   Subtest B: (5 items) After listening to a melody played on a particular instrument within an orchestra setting, the subject identifies from the four possible choices, the correct instrument. If the four instrument choices do not match the instrument heard, the subject fills in the blank marked "O." Colwell defines this as "the ability to identify . . . accompanied instruments from an aural example" (p. 106-7).

The MAT4[2] consists of "five" subtests:

1. Musical Style: (40 items)
   Subtest A: Composer (4ST1): (20 items) After listening to a short orchestral excerpt, the subject selects from four choices the composer whose style most closely resembles that of the musical excerpt. Colwell defines this as "the ability to categorize music as to genre and style" (p. 166).

   Subtest B: Texture (4ST2): (20 items) After listening to a short musical composition played on a piano, the subject marks the blank "M" for monophonic, "H" for homophonic, "P" for polyphonic, or "?" to indicate if she is in doubt. Colwell defines this as "the ability to categorize music as to genre and style" (p. 166).

2. Auditory-Visual Discrimination (4ST3): (14 items) After listening and viewing a four-measure melody, the subject fills in a blank below every measure in which the notation is rhythmically different from the melody he hears. If all the measures are correct, he fills in the blank marked "O". Colwell defines this as "the ability to accurately read rhythmic notation" (p. 169-170).

3. Chord Recognition (4ST4): (15 items) A block chord is played on the piano, and afterwards, three trial chords are played. The subject identifies from the three trial chords the one which sounds like the first chord. If none of the three chords are like the first chord, then she fills in the blank marked "O". If in doubt, she fills in the blank marked "?". Colwell defines this as "the ability to recall the sound of a chord, either by listening for its general

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2. For this study plus other related studies, Colwell's MAT4 subtest 4 (Chord Recognition) was re-organized into two subtests and that are reported as MAT4 ST3 and MAT4 ST4.

harmonic characteristics, by recognition of the chord as an entity, or by mentally singing the pitches of the chord" (p. 170-71).

4. Cadence Recognition (4ST5): (15 items) After listening to a short musical phrase played on a piano, the subject identifies the cadence by filling in the blank "F" for full cadence, "H" for half cadence, and "D" for deceptive cadence. If the subject is in doubt, he fills in the blank marked question "?". Colwell defines this as "the ability to distinguish among three common kinds of cadence (full, half, deceptive)" (p. 173-174).

## V. METHODOLOGY

The nine questions related to this study are:

1. What is the typical high school academic profile for music majors?
2. Which music activities do music majors participate in the most and least during high school?
3. Which activity(s), as reflected by the opinions of music majors, are rated as having the most and least impact in developing MI?
4. How do the high school academic profile, years of participation, and musical expectations differ between the high, medium high, average, medium low, and low MI music majors?
5. Which of the MAT3 or MAT4 subtests has the strongest relationship to the student's MI?
6. What are the relationships between MI and the study's 11 individual activities under each area (i.e., academic, years of participation, and perceptions)?
7. What are the relationships between the study's three areas and corresponding activities with all other areas and activities?
8. What music activities have the most and least impact on MI?
9. How does the statistical procedure used impact the study's conclusions?

The researchers made the assumption that music majors had more urgency in developing musical skills during high school than non-music majors. Perhaps realizing the strong possibility of becoming professional music educators or performers, music majors might have participated in high school music activities that were directly linked to the development of MI. Non-music majors might have participated in music activities for reasons other than MI development. Realizing that the comparison between music majors and non-music majors might provide additional insights regarding the evaluation of student outcome, the authors plan to report this analysis in a future report.

Non-music majors (n=78) were eliminated from the total participant population (n=354), leaving the music major (n=276) data for the rest of the study. The MAT3 and MAT4 scores were summed, and the grand total test scores were computed and converted to z-scores. Next, the student's z-scores were organized into five groupings:

high outcome (HIO) (+2.05Z to +1.00Z [n=55] ), medium high outcome (MHO) (.99 Z to .25Z [n=103] ), average outcome (AVO) (+.24Z to -.24Z [(n=64] ), medium low outcome (MLO) (-.25Z to -.99Z [n=79]), and low outcome (LOO) ( -1.00Z to -4.32Z [n=53]).

In response to question 1, researchers described the student's high school grade point average, ACT score and SAT score. Descriptive analysis included mean scores, kurtosis, and skewness. Shapiro-Wilk W and resulting probability were used to examine the normal distribution for each academic profile area.

Descriptive statistics were used to answer question 2. Mean scores, median scores, and standard deviations were developed for each of the 11 music activities. Next, z-scores and ranks were developed to compare each of the 11 activities. The Shapiro-Wilk W test was used to evaluate the normal distribution for each of the study's items.

To answer question 3, music majors were asked to rate (using a 5-point Likert scale, *e.g., very important, important, somewhat important, little importance, not importance*) how each of the 11 activities help develop musicianship. Mean scores, standard deviations, median scores, and ranks were developed for each activity. The Shapiro-Wilk W test was then used.

To answer question 4, the music majors were again grouped into five outcome levels: high (HIO), medium high (MHO), average (AVO), medium low (MLO), and low (LOO). Mean scores were developed for each outcome level and their academic profile indicators, years of participation in each activity, and their rating of each activity's importance. The Brown-Forsythe was used to examine the homogeneity of variance for each of the study's items, and both the Welch ANOVA and the One Way ANOVA were used to examine whether the outcome groups were significantly different. Then, the Student's-t and the Scheffe were used to identify differences between groups, and the permutation statistic was used to illustrate trend lines between groups.

In response to Question 5, the Pearson Product Moment correlation was used to evaluate the relationships between the MAT3 and MAT4 and their respective subtests. Relationships were examined between the MAT3 and MAT4 and their respective subtests and the students' grand total score.

For question 6, the Pearson Product Moment correlation statistic was used to compare each of the study's items with all other items. A correlation matrix was developed by item and by area (academic profile, number of years of participation, etc.). For simplicity, correlations with a $\pm$ .40 ($p \leq .01$) or larger were evaluated. To examine the important and unimportant music activities that impact MI, correlations were developed between the grand total score (*MAT3 and MAT4 used as an indicator of MI*) and all of the other study items.

To answer question 7, the Pearson Product Moment correlation matrix identified in question 5 was further analyzed. Each area and related items were compared to items all of the other areas and corresponding items.

In response to question 8, four different statistical treatments were applied to the data including: Pearson Product Moment correlation, Guttman's Partial Correlation, Stepwise Regression, and Multiple Regression. Using the

resulting percentage of variance common between the independent variables and the dependent variable (MI), the data analyses from the four different treatments were compared between statistical treatments. The Multiple Regression analysis was treated slightly different, for this statistic reports the "p" and F-test score for the total model; further, it provides a probability and t-value for each of the 33 independent variables.

Using the study's data analysis in question 8, no further analysis was performed to answer question 9. Findings from the Pearson Product Moment Correlation, Guttman's Partial Correlation, Stepwise Regression (Forward), and Multiple Regression analyses were compared.

Unless otherwise reported, this study used the .05 level of significance.

## VI. FINDINGS

Of the study's 354 participants, the 78 non-music-majors were eliminated from the pool of participants, leaving 276 music majors to be evaluated. Students provided their high school GPA, SAT, and ACT scores; they responded three times for each of the 11 high school music activities by indicating number of years of participation for each activity and their ranking of each activity in developing MI. Below are the findings for the first eight research questions.

### 1. What is the typical high school academic profile for music majors?

Of the study's 276 music majors (MM), 259 reported their high school GPA, 118 reported their ACT score and 165 reported their SAT (see Appendix B). The MM mean high school GPA was 3.3, the median score was 3.4, a standard deviation of 0.5, kurtosis of 1.9, and a skewness of -1.06. The mean and median ACT scores were 25, the standard deviation was 3.9, kurtosis was -0.7, and the skewness was -0.3. Finally, the MMs' mean SAT score was 1066, and the standard deviation was 154, with a kurtosis of -0.3 and a skewness of 0.06. Use of the **Shapiro-Wilk W** indicated that the high school GPA and the ACT scores were not normally distributed, but the SAT scores were.

### 2. Which music activities do music majors participate in the most and least during high school?

The activities the MMs participated in the most--approximately three or more years--were solo-ensemble (M=3.6), marching contests (M=3.1), private lessons (M=2.9 ), and concert festival (M=2.9 ) (z-score=1.5, 1.1, 1.0, and 0.9, respectively). Each activity had a wide range of participation (SD=1.6, 1.8, 3.2, and 1.9, respectively). The music activities the MMs participated the least years in were all-state choir (M=.1 ), all-state jazz band (M=.1), and all-state orchestra (M=.3 ) (z-score=-1.2, -1.2, -1.0, respectively) (SD=0.4, 0.4, and 0.8, respectively). The activities that had an average participation of one to two years were high school jazz band, church/community choir, community band, and all-state band (z=.1, -0.3, -0.5, and -0.5; M=1.2, 1.2, 1.0, and 1.0, respectively).

Activities with the largest MM percentage of participation were solo-ensemble (93%), marching contests

(82%), private lessons (78%), and concert festival (77%). The activities with the least participation included all-state choir (5%), all-state jazz band (6%), and all-state orchestra (17%).

Private lessons, all-state choir, all-state jazz band, and all-state orchestra had the largest kurtosis (K=60, 45, 34, and 15 respectively), while all-state band, community band, and solo-ensemble were closer to a normal distribution (K=0.7, 0.5, and 0.5, respectively). Concert festival and solo-ensemble were negative skewed, and the other nine were positively skewed. All-state choir, all-state jazz band, private lessons, and all-state orchestra reflected the largest positive skewness (6.3, 5.8, 5.5, and 3.7, respectively). The **SHAPIRO-Wilk W** analysis indicated that none of the distributions were normally distributed.

3. **Which activity(s), as reflected by the opinions of music majors, are rated as having the most and least impact in developing MI?**

The music majors rated private lessons, and solo-ensemble (M=4.8, 4.6; z=1.9, 1.6, respectively) as having the **largest** impact on the development of their musicianship, and rated church/community choir, and marching contests as having the **least** impact on the development of their MI (M=3.0, 3.0; z=-1.1, -1.0, respectively ) (see Appendix B).

4. **How does the high school academic profile, years of participation, and musical expectations differ between the high, medium high, average, medium low, and low MI music majors?**

a. **Academic Profile.** The MMs were organized into five outcome levels–high (HIO), medium high (MHO), average (AVO), medium low (MLO), and low (LOO)–see Appendix C. Their high school academic profile was examined by group. The HIO group received the largest GPA average, ACT mean scores, and SAT mean scores (M=3.5, 1150, 26.6, respectively), the LOO group received the lowest GPA and ACT scores (M=3.0, 937, respectively), and the MLO received the lowest ACT scores (M=23.3). In addition, note that the SAT and ACT mean scores of the HIO, MHO, and the AVO music majors groups are one or more standard deviations above the national mean scores (SAT=1150, 1095, and 1062; ACT=26.6, 25.3, and 25.0, respectively).

Both the **Welch ANOVA** statistic and **One Way ANOVA** statistic were used to evaluate the differences between groups. There was a significant difference ($p \leq .01$) among the five groups for both the high school GPA mean scores and the SAT mean scores, but no significant difference for the ACT mean scores. Next, both the **Student's t** and the **Scheffe** tests were used to identify differences between groups. When the Student's t-statistic was used to evaluate the high school GPA and SAT scores, it identified four high school GPA combinations of groups where there was a significant difference between groups, six SAT combinations, and two ACT combinations. Using the Scheffe to evaluate the same data, it identified two GPA groups, three SAT groups, but no ACT groups. The permutation statistic suggested a large significant trend-line between the top and bottom student for GPA mean scores and SAT scores, and a smaller significant difference for the ACT scores.

b. **Years of Participation.** Mean years of participation in 11 high school music activities were compared by outcome groups. The HIO participated the most years in ASB, ASO, CF, SE, MC, and PL, the MHO participated the most years in HSJB, the AVO participated the most years in CB, and the LOO participated the most in ASJB, ASC, CCC, and CB. Note that collectively, the typical HIO music major participated in 20-plus years in a variety of music activities, while even the LOO participated 18-plus years. In addition, the HIO participated three-plus years in CF, SE, MC, and PL, one to two years in ASB, CCC, HSJB, and CB, and less than one year in ASJB and ASC. Next, the HIO generally participated in a variety of music activities with a mean participation of 1.8 years per activity. Other than SE and MC, music majors participated in more years in PL than in any of the other ten music activities.

When the **Welch** ANOVA and the **One-Way** ANOVA were used to examine the differences between groups, there was a significant difference among groups ($p \leq .01$, .01, respectively) for both analyses for ASB. The Welch ANOVA statistic found a significant difference between groups for ASO, but the One Way ANOVA indicated no difference. There was no significant difference between groups for the other ten high school activities.

Next, the Students and the Scheffe were used to identify differences between groups. The **ASB** activity was the single activity where significant differences were observed using both statistics. The Student's statistic identified five groups with significant differences while the Scheffe identified two. The Student's identified one grouping for **ASO**, but the Scheffe identified no groupings that were significantly different. When the Student's and Scheffe were used to identify differences between groups for the other ten activities, there were no significant differences between groups.

Permutation statistic was also used to examine the differences between outcome groups. The trend-line between groups between HIO and MLO suggests that participation in all-state band had a positive impact on MI. There was no additional trend-lines for group outcomes for the other 10 high school activities.

The mean scores for each for the 11 activities for the five outcome levels were summed. The HIO averaged 20.2 years of participation in all 11 music activities, the LOO averaged 18.3 years, the AVO averaged 17.8 years, the MHO averaged 17.3 years, and the MLO averaged 17.0 years.

c. **Student Ratings.** Using a Likert-type scale, the MM rated each activity's impact on developing MI (see Appendix C, p.2). Mean scores were developed for each of the five outcome groups. The **HIO** ranked PL, SE, ASB, and ASO the highest, while the LOO ranked PL, SE, CF, and HSJB as the most important in developing MI. The **HIO** ranked MC, CB, HSJB, CCC, and ASJB as the least important. While the HIO ranked MC last in importance, the LOO ranked MC 6th. While rankings of the 11 activities were often similar among the 5 outcome groups, there were notable differences between the relative ratings of the activities. The HIO rated PL, ASB, ASO, and ASC as more important than did the MHO, AO and MLO groups.

Both the **Welch ANOVA** and the **One-Way ANOVA** identified significant differences between the outcome groups for CF, MC, and HSJB, and the Welch ANOVA statistic was used to identify significant differences for PL. The **Student's t** statistic was used to identify specific differences for PL, CF, MC, PL, CCC, and HSJB–five activities–while the **Scheffe** helped to identify differences for MC and HSJB. MC was the single activity with numerous significant differences identified between outcome groups by both statistical treatments.

Finally, the **permutation** statistic was used to compare trend-lines between the five outcome groups. There is a strong probability ($p \leq .01$) that the trend-line between groups for MC, HSJB, and CB reflects that HIO students de-emphasize the positive impact that these activities had on MI. The Welch/One Way ANOVA and Student's/Scheffe did not identify differences between groups for the community band activity and MI.

**5. Which of the MAT3 or MAT4 subtests has the strongest relationship to the student's MI?**

The Pearson Product Moment correlation matrix was developed between the MAT3 and MAT4, their respective subtests, and the student's GT score (see Appendix D). There was a positive relationship between each subtest and all other subtests. The correlation analysis below indicated no significant correlation ($p \leq .05$) between nine combinations of subtests. Note that MAT3 ST4 (*Instrument Recognition*) is identified four times, MAT3 ST1 (*Total Memory*) and MAT4 ST3 (*Chord Recognition*) three times, and MAT4 ST4 (*Chord Recognition*) twice. MAT3 ST2, MAT3 ST3, MAT4 ST1, MAT 4 ST 2 and MAT4 ST5 were identified once each.

| | r | Subtest | Musical Skill | Subtest | Musical Skill |
|---|---|---|---|---|---|
| 1. | .131 | MAT4 ST1 | Musical Style | MAT4 ST4 | Chord |
| 2. | .160 | MAT3 ST4 | Instrument | MAT4 ST3 | Chord |
| 3. | .164 | MAT3 ST3 | Pitch | MAT3 ST4 | Instrument |
| 4. | .178 | MAT3 ST4 | Instrument | MAT4 ST2 | Auditory-Visual |
| 5. | .182 | MAT3 ST4 | Instrument | MAT4 ST5 | Cadence |
| 6. | .203 | MAT3 ST1 | Tonal | MAT4 ST1 | Musical Style |
| 7. | .214 | MAT4 ST3 | Chord | MAT4 ST4 | Chord |
| 8. | .226 | MAT3 ST2 | Melody | MAT3 ST4 | Instrument |
| 9. | .227 | MAT3 ST1 | Tonal | MAT4 ST3 | Chord |

The subtests with the strongest relationship with other subtests were identified. As the correlation analysis indicates below, MAT3 ST3 (*Pitch Recognition*) is identified four times, MAT 4 ST2 (*Audio-Visual*) three times, MAT3 ST1 (*Tonal Recognition*), MAT3 ST2 (*Melody Recognition*), MAT4 ST3 (*Chord*), and MAT4 ST4 (Chord Recognition) were identified twice, and MAT4 ST5 (*Cadence*) was identified once.

| | r | Subtest | Musical Skill | Subtest | Musical Skill |
|---|---|---|---|---|---|
| 1. | .440 | MAT3 ST2 | Melody | MAT3 ST3 | Pitch |
| 2. | .385 | MAT3 ST2 | Melody | MAT4 ST3 | Chord |
| 3. | .381 | MAT3 ST1 | Tonal | MAT3 ST3 | Pitch |
| 4. | .374 | MAT3 ST3 | Pitch | MAT4 ST2 | Auditory-Visual |
| 5. | .356 | MAT4 ST4 | Chord | MAT4 ST5 | Cadence |
| 6. | .345 | MAT3 ST1 | Tonal | MAT4 ST4 | Chord |
| 7. | .342 | MAT4 ST3 | Chord | MAT4 ST2 | Auditory-Visual |
| 8. | .335 | MAT3 ST3 | Pitch | MAT4 ST2 | Auditory-Visual |

Relationships between MAT3 and MAT4 subtests were compared to the student's GT score. Four subtests with the strongest ($r \geq .6$) relationship to the student's GT (i.e., level of MI) score included MAT3 ST2 (*Melody Recognition*), MAT3 ST3 (*Pitch Recognition*), MAT4 ST1 (*Musical Style*), and MAT4 ST2 (*Auditory-Visual Discrimination)* ($r = .68, .69, .63$, and $.65$, respectively). There was a significant relationship between the MAT3 and MAT4 subtest scores and the MAT3 and MAT4 total scores.

**6. What are the relationships between MI and the study's 11 individual activities under each area (i.e., academic, years of participation, and perceptions)?**

The Pearson Product Moment correlation matrix was developed to identify significant relationships between the student's outcome and the study's different activities (see Appendix E). There was a significant correlation ($p \leq .05$) between the students GT score and the number of years the student participated in ASB ($r = .40$) and the student's rating of ASB ($r = .45$ ) and ASO ($r = .48$). Note that there was no significant correlation between the number of years a student participated in ASO, ASC, CF, SE, MC, PL, CCC, HSJB, and CB and MI.

When the students' ratings were examined, there was no significant correlation between ASC, CF, SE, MC, PL, CCC, HSJB, and CB and MI. ASB is the single activity that had a significantly large positive correlation ($r < .40$) when evaluated from the study's three perspectives (i.e., years of participation, student's rating, and high school director's rating).

**7. What are the relationships between the study's areas and corresponding items with all other areas and items?**

Below, very large ($r \leq .40$) Pearson Product Moment correlations were examined between the various study items. Other correlations were significant, but not noted by the authors. See Appendix E for data analysis related to the comparisons below.

**a. High School academic outcomes *versus* postsecondary GT scores, years of participation in HS music activities, and student's rating.** There was a significant relationship between the students' SAT scores and

their GT scores, but no significantly positive relationship between the students' high school GPA or ACT scores ($r \leq .00$, .29, respectively) and their GT scores.

Of the three high school academic indicators, there was a large ($r \pm .40$) significant correlation between at least two academic indicators and years of participation for (1) CF and MC, and (2) student's ratings of ASB, ASO, ASJB, and CF. When academic outcomes were compared to student's ratings, ASB, ASO, ASJB, and CF were the four activities with a significantly large relationship ($r \leq .4$).

b. **Years of Participation in music activities vs. the students' GT score, HS academic outcome scores, and students' ratings.** Positive and negative relationships were noted between years of participation in the 11 music activities and the student's grand total (GT) score, HS academic outcomes, and student ratings (Table 1).

There was a significant positive correlation between the years of participation in ASB and GT scores ($r \leq .40$), while there was no significant positive relationship between the years of participation in the other 10 high school activities and GT scores. Generally, there were significant relationships between the number of years of participation in CF and MC and the three high school academic indicators (GPA, SAT, and ACT). Table 1 illustrates the activities with the largest positive relationships between the years of participation and the study's other measurements.

Some interesting observations can be made from the **state-related** music activities. Generally, the more years the students participated in All-State Band, the higher they rated HSJB in developing MI. Next, the more years a student participated in All-State Orchestra, the more years they took PLs and participated in CCC, but the lower they rated CB as important in developing MI. The more years a student participated in All-State Choir, the fewer years they participated in CF and MC, the lower they rated CF and HSJB in developing MI. The more years a student participated in Concert Festival, the more years they spent in MC, fewer years they participated in ASC, and the higher they rated CF and HSJB in developing musicianship. The more years a student participated in Solo-ensemble, the more years they participated in CB, and the higher they rated SE and PL in developing musicianship.

Non-state related music activities were then evaluated. The more years students took PL, the more years they generally participated in ASO and CB. Of all the activities measured by either the number of years of participation or students' ratings, CB (years participation) was the single item where there was a significant large correlation ($p \leq .01$, $r = +.53$) with the number of years a student took private lessons.

The more years students participated in CCC, the more years they participated in ASO and CCC. Next, years of participation in HSJB was compared to the study's other items. There was a significant negative relationship between HSJB and PL. The more years students participated in Community Band, the more years a student participated in MC. Finally, years of participation in music activities were compared to academic indicators. The more years students

Table 1 Results of the Pearson Product Moment correlation data analysis to examine the student's participation (years) in 11 music activities (see Appendix E).

**Positive Correlations**

| +.r | Years in Activity | Other Activity | # Years | Students' Rating |
|---|---|---|---|---|
| .62 | CF | CF | | X |
| .62 | ASB | HSJB | | X |
| .53 | SE | SE | | X |
| .53 | CB | CCC | X | |
| .51 | MC | CF | X | |
| .51 | MC | HSJB | | X |
| .50 | CB | SE | X | |
| .48 | CF | PL | | |
| .44 | CF | HSJB | | X |
| .43 | ASC | CB | | X |
| .42 | ASB | CCC | X | |
| .42 | SE | CCC | | X |
| .42 | SE | PL | | X |
| .42 | ASO | PL | | |
| .41 | ASB | PL | X | |
| .41 | CF | CF | | |
| .40 | CB | MC | | X |

**Negative Correlations**

| -.r | Years in Activity | Activity | Years | Student's Rating |
|---|---|---|---|---|
| -.83 | MC | ASC | X | |
| -.62 | PL | CF | | X |
| -.62 | MC | ASO | | |
| -.61 | MC | CF | | |
| -.60 | MC | ASC | | |
| -.54 | ASC | CF | | X |
| -.54 | MC | HSJB | | |
| -.52 | MC | ASB | | |
| -.48 | ASO | CB | | X |
| -.46 | ASC | HSJB | | X |
| -.45 | ASC | CF | X | |
| -.45 | SE | ASO | | X |
| -.43 | HSJB | PL | | X |
| -.41 | MC | CCC | | |

CF = Concert Festival; ASB = All-state Band; SE = Solo-ensemble; CB = Concert Band; MC = Marching Contests; ASC = All-state Choir; ASO = All-state Orchestra; PL = Private Lessons; and HSJB = High School Jazz Band.

participated in CF and MC, the higher they scored on their HS outcome indicators--HS GPA, ACT score, and SAT score.

c. **Student's rating versus GT scores, HS academic profile, and years of participation.** Pearson Product Moment correlation was used to compare the student's ratings of the 11 high school activities with the student's postsecondary GT scores, high school academic profile, and years of participation.

There was a significant relationship between the student's rating of ASB and ASO and their GT scores. Except for the student's ratings between SE and MC with the student GT scores, all other relationships were positive. The relationships between the student's rating of the 11 high school activities with MAT3 and MAT4 were similar.

There was no significant correlation between the student's HS GPA and any of the student's ratings of the 11 high school activities. There was a significant correlation between the student's national tests (SAT and ACT) and four of the five HS academic indicators --ASB, ASO, ASJB, and CF. There were no large correlations between the HS academic indicators and ASC, SE, MC, PL, CCC, and CB.

The students' ratings were compared to years of participation in the 11 high school activities. There was a positive significant correlation between CF and years of participation in CF, between the student ratings of SE and years participating in SE, between the student ratings of MC and years in CB, the student ratings of PL and years spent participating in SE, and between the student ratings of HSJB and the number of years the student participated in ASB, CF, MC and HSJB. There was a negative significant correlation between the student ratings of ASO and SE, between the ratings of CF and CF and PL, between the student ratings of PL and HSJB, between the ratings of HSJB and years participating in ASC, and between CB and years participating in ASC. There are a greater number of relationships between the student ratings and years of participation that are not significant than relationships that are significant.

8. **What music activities have the most and least impact on MI?**

Four types of analysis were performed on the study's data to evaluate the impact each of the independent variables had on the dependent variable (GT score). First, the percentage of variance for each of the Pearson Product Moment correlations were developed for the student's GT score and each of the 11 high school activities from two perspectives (i.e., total years of participation and student ratings). Z-scores and ranks were developed for each independent variable. Second, the percentage of variance for the Guttman's partial correlations were developed for each of the study's items, with z-scores and ranks developed for each of the study's 33 items. Third, Stepwise Multiple Regression statistic was used to identify which independent variable affected the dependent variable (GT score) and to what extent. Fourth, the Multiple Regression statistic was used to analyze the extent all the independent variables collectively had on the student's MI outcome.

a. **Pearson Product Moment Correlation.** As illustrated in Appendix F, when the Pearson Product Moment correlation statistic was used to examine the data, the items with a percentage of variance larger that 15% included the number of years the student participated in ASB (16%) and the student ratings of ASB (20%), ASO (23%), ASJB (15%). Items with less than three percent of variance between the independent variable and the dependent variable (GT score) included years the student participated in ASC (2%), SE (0%), MC (1%), PL (1%), CCC (2%), HSJB (3%), and CB (1%). The student ratings that reflected negligible impact on the GT score included SE(3%), HSJB (0%), and CB (1%).

b. **Guttman's Partial Correlation.** The *Guttman's Partial Correlation* statistic was used to analyze the same data (see Appendix F). After summing the variance for each area, the years of participation accounted for 8% of student MI outcome and the student's rating accounted for 10%; both areas have approximately the same impact on the student's GT score. The items with the largest (≥2%) percentage of variance between the independent variable and dependent variable included the number of years a student participated in ASB (3%, z=.4) and ASJB (3%, z=1.1) and the student ratings of MC (3%, z=.1) and CB (2%, z=1.7).

c. **Stepwise Regression.** Next, the *Stepwise Regression* statistic was used to isolate the variables that had a significant ($p \leq .05$) impact on the student's MI. As Appendix G illustrates, the Stepwise Regression statistic was used to identify two independent variables that had a significant impact on the student's GT scores. Collectively, although the $r^2$ accounted for 12%, the adjusted $r^2$ accounted for 10% of the variance between the 33 independent variables and student MI outcome. The two variables that had a significant impact on the GT score included student ratings of MC (7%) and CB (4%). Although 20 of the study's variables did not have a significant impact on the student's GT score, the partial correlation statistic showed that these 20 variables accounted for 14% of the variance.

d. **Multiple Regression.** The *Multiple Regression* statistic was used to calculate the total impact that all the independent variables had on the dependent variable (see Appendix H). The 22 independent variables collectively in the Multiple Regression statistic are not statistically significant ($p \leq .14$). Although the Multiple Regression $r^2$ accounted for 24%, the adjusted $r^2$ accounted for 7%, a drop of 17% between the $r^2$ and the adjusted $r^2$. The item with the smallest probability was the student ratings of marching contests ($p \leq .08$).

e. **Comparison among the four different statistics.** As Table 2 illustrates, the items with the largest impact on MI were identified for each of the statistical analyses. While one statistical analysis suggests that an item has a large impact on MI, another analysis often produces contradictory results. Considering the different analyses for the student ratings of ASO, the Pearson Product Moment suggests that it accounts for 23% of the variance between the independent variable and the dependent variable, but the Guttman's Partial Correlation (0%) , Stepwise Regression (i.e., not identified at p≤.05), and Multiple Regression (p≤.87) indicate that it does not impact on MI. In another example, the student rating of MC is evaluated, the Pearson Product Moment statistic suggest that it accounts for 13% of the variance, the Guttman's Partial Correlation suggest that it accounts for 2%, Stepwise Regression implies that it accounts for 7% of the variance, and the Multiple Regression computes that it does not have a significant impact on student outcome (p≤.08).

Table 2. The Pearson Product Moment correlation, Guttman's Partial Correlation, Stepwise Regression, and the Multiple Regression statistics were applied to 11 high school activities and measured from two perspectives: (1) number of years and (2) student ratings. The items with the greatest impact on MI were identified (i.e., 1st, 2nd, etc.). (Refer to complete data Analysis in Appendices E, F, G, and H).

| Study's Items | Pearson Product Moment | Guttman's Partial Correlation | Stepwise Regression (Forward) | Multiple Regression |
|---|---|---|---|---|
| Percent and/or Probability | % / Rank * | % / Rank * | (2 Steps) p≤.05 % / rank * | p≤ |
| **Number of Years** | | | | |
| C4 ASB | 16% - 19th | 3% - 20th | – | .85 ** |
| C4 ASJB | 3% | 4% - 22nd | – | .68 ** |
| C4 ASC | 2% | 1% - 18th | – | .98 ** |
| **Student Ratings** | | | | |
| C5 ASB | 20% - 20th | 1% | – | .35 ** |
| C5 ASO | 23% - 21st | 0% | – | .87 ** |
| C5 ASJB | 15% - 18th | 0% | – | .65 ** |
| C5 CB | 1% | 2% - 21st | 4% - 21st | .15 ** |
| C5 MC | 13% | 2% - 19th | 7 %- 22nd | .08 ** |

* Rank: The largest percentage equals the largest rank (e.g., When the 22 independent variables are collectively examined, Student Rankings for ASO for Pearson Product Moment Correlation is 23% and the largest percentage of variance between the independent variable and the dependent variable.)

** Not significant at the .05 level of significance.

Generally, the percentage of variance is vastly different between the Pearson Product Moment Correlation and Guttman's Partial Correlation, and both of these statistical procedures appear to have nothing more than a random relationship to either of the regression models.

**9. How does the statistical procedure impact the study's conclusions?**

As observed in Appendix I, the percentage of variance is calculated when the Pearson Product Moment correlation was used to analyze the study's data. The percentages for each of the two (years and perceptions) were summed by area then distributed by percentage. The student's perceptions collectively represent 73% of the things that impact the GT score, and the number of years of participation represents 27%.

Next, after the Guttman's Partial correlation is calculated for each of the study's 33 items and a percentage of variance is developed for each item, the percentage of variance is summed by area (see Appendix I). The number of years a student participated in the 11 music activities accounted for 8% of the variance between the independent variable and the dependent variable, and the student's ratings accounted for 10%. Note that after using the Guttman's Partial Correlation and summing by areas, 82% of the variance is missing or not accounted for by the independent variables.

The assumptions for the Pearson Product Moment and Guttman's Partial Correlation are different. The Pearson Product Moment statistic generally assumes that the percentage of variance for each of the study's 22 study items is discrete and there is no overlap with any of the other items. The Guttman's Correlation first examines and eliminates the overlap between the independent variables, and then examines the "true" relationship between each of the independent variables and the dependent variable. Where the Pearson Product Moment assumes that 100% of the variables have been identified and are discrete, the Guttman's Partial correlation eliminates the "contamination" or overlap between variables and then examines the "non-overlapping" impact each of the independent variables has on the dependent variable.

## VII. CONCLUSIONS

**1. Music majors attain high academic achievement.**

The mean ACT and SAT scores for music majors are more than one standard deviation above national mean scores. The question remains: "Does music attract smarter people or does music make people smarter?" Instrumental musicians are actively engaged in the higher level cognitive skills of application, analysis, and evaluation whenever they rehearse, practice or perform. These musicians constantly monitor, evaluate, and adjust their performance from both a micro and macro perspective. Not only must instrumental musicians perform with good tone, in tempo, in style, and with correct notes, rhythms, and appropriate musical expression, they must also make the musical judgements to

appropriately fit their performance into an ensemble of other musicians. Musicians are constantly required to make qualitative as well as quantitative judgements every time they make a sound. Do these higher level cognitive skills, learned in instrumental music, affect other areas of learning? Does this constant multi-tasking make a difference in other academic areas?

**2. Some academic outcome measures are not good indicators of student outcome.**

All of the academic indicators in this study do not appear to be reliable in reflecting student outcome. The MMs' GPAs are clustered and peak near the mean, the median score is above the mean score, and the sample does not reflect a normal distribution. Therefore, researchers should be wary of using this measure as a reliable measure of student outcome. Regarding MI, there was no significant relationship between the student's GPA and MAT3, MAT4 or GT scores (the measure of MI). Simply, a student's HS grades should not influence music scholarships, ensemble placement, or be used as a predictor of the student's potential postsecondary MI. The ACT score is a marginal predictor of MI outcome. Although the Kurtosis and Skewness are more promising than the student's GPA score, the ACT too is not normally distributed, and further, does not have a strong relationship to MI indicators (MAT3, MAT4, or GT).

The SAT score seems to be the only reliable indicator of student MI. The Kurtosis, Skewness, and distribution are normal (significant at .05). Further, it is the single HS academic indicator that has a strong significant relationship to the study's MI indicators.

**3. Increased participation in diverse activities does not guarantee improved outcome in one measure.**

Outcome is a result of time on task and doing the right things (time x quality). The number of years a student participates in all the 11 high school music activities is highest for the high outcome group (20.2). However, it does not appear that participation in itself is the key, as the second highest years of participation (18.3) is in the low outcome group. Statistically, the only activity that has a significant correlation between outcome and years of participation is ASB. While statistics can report on the amount, or quantity, of the 11 high school music activities, they cannot report on the relative quality of the activities experienced by students, who come from different schools and different communities and who have different parents, middle school/high school band directors, and private teachers.

Students believe that private lessons are an important high school music activity. Private lessons are rated first in importance by students. The only band activities that have more years of participation than private lessons are marching contests and solo-ensemble. Unfortunately, the importance afforded to private instruction does not guarantee that the instruction will be of high quality or that the student will be sufficiently disciplined or motivated to make best use of the instruction presented in the lessons.

4. **Top and bottom MI students have different perceptions of the relative importance of high school music activities.**

While both the high outcome and low outcome students rank private lessons and solo-ensemble first and second in importance, there is a difference in the urgency afforded to each (see Appendix C). The more MI the students are, the more urgency (higher rating) they place on private lessons, all-state band, and all-state orchestra. The lesser MI students place more urgency on marching contests, concert band, and high school jazz band. In addition, the marching contest activity was rated sixth in importance by the low outcome students but last in importance by the high outcome group. The Scheffe analysis (see Appendix C) reinforces the permutation statistic because it identified both the marching contest and high school jazz band as two activities that the higher outcome students devalue and lower outcome students emphasize in developing MI.

5. **Perceptions have a marginal value when they are used to evaluate MI or other factors that impact outcome.**

Generally, the student ratings have little importance when used to examine issues impacting student outcome. As Appendix E illustrates, the student ratings do not provide valuable information in either evaluating MI, or the factors that contribute to MI outcome. Perceptions might have a small value in evaluating some state music activities (ASB, ASO, ASJB, and CF) and MC, but no value in examining local music activities such as PL, CCC, HSJB, or CB. Student perceptions do have a nominal value in examining a few issues relating ASC, CF, and SE.

6. **Private lessons and all-state band are valuable educational activities in developing MI.**

a. **Private Lessons (PL)** Although private lessons is the third most widely participated HS music activity (Appendix B), it is rated by MMs as the most valuable high school activity of all 11 music activities (Appendix C). The top outcome group rates it as the most valuable activity, as does the lowest outcome group. Interestingly, the higher the MI outcome level, the higher students rate it (see permutation statistic, Appendix C). Years of participation in PL does not seem to impact student outcome (r=.09), nor do the student ratings strongly translate into MI outcome.

Private lessons are one of the primary cornerstones in the high school instrumental student's musical development. Since there are good and bad private teachers, what are some of the important things that a student should consider when selecting a private teacher? At the high school level, students should possibly seek teachers with a proven "track-record"; i.e., students who make Superior ratings at solo-ensemble, participate in all-state band and summer music camps, and eventually major in music at prestigious postsecondary schools. At the college, post-graduate, or professional level, perhaps the **good** teachers are those whose students perform in major recital halls, record on CDs, and play their instrument professionally, while the bad teachers . . ..

b. **All-state band (ASB)** Fewer than half (48%) of the MMs participated in all-state band. While the MMs averaged four years in SE, three years of participation in CF, PLs, and MC, and over one year in both HSJB and CCC, they averaged only **one** year in ASB (see Appendix B). Simply, ASB was the fourth least participated activity of the 11 HS music activities examined. When the Kurtosis, Skewness, and slope (Shapiro Wilk W test) analyses were examined, the distribution was relatively close to being normally distributed, although not significantly normally distributed. When the students were asked to rate the importance of ASB, the students rated it the third most important of the 11 high school music activities.

When the Welch ANOVA/One-Way ANOVA, Students/Scheffe, and permutation analysis for years of participation were examined (see Appendix C), ASB was the single activity with a significant difference between the five different outcome levels. The top MI students participate in ASB more than the lower MI students. Further, the student ratings and the five outcome levels were compared, indicating that ASB was one of the most important high school activities.

The Pearson Product Moment correlation was used to examine the percentage of variance between the independent variables and outcome. The years of participation in ASB was the single activity with a significant relationship to MI (16%)--the other 10 activities in the years of participation area did not have a strong impact on MI (see Appendix F). This is probably because the recognition of advanced MI is the main criterion for selection to ASB. There was a positive, strong relationship between the student (20%) ratings of ASB and MI. When the Guttman's Partial Correlation was used to examine the data, years of participation in ASB had the second largest impact of all 11 activities (3%-Appendix F).

Although there is a strong relationship between ASB and MI, only 48% of music majors participated in ASB--52% did not. Why? Did they just not try out, or were they not selected? Earlier research (Bobbett, 1989, 1991b ) suggested that the better music majors (in terms of MI) dropped out of music between their freshman and junior years in college. This study suggests that very good instrumentalists may start rejecting music as a profession as early as high school, implying that a majority of top ASB students do not major in music in college. Perhaps most of the ASB students choose other, more financially lucrative professions, like medicine or engineering, or either attend a major music conservatory (not a state institution like the ones in this study).

The authors have observed several anomalies regarding ASB. A student auditioning and being selected by a panel of judges to participate in ASB does not represent a perfect process. For example, for three years a student never received solo chair in the regional band, but won solo chair at the state level during the same three years. In another example, when a panel of judges were selected from the state at-large and then asked to judge at the regional level, there was a strong relationship between the region where the judge lived and the students selected for the top chairs in the state. During the next year, when the the judges and their region changed, so the talent in the state also apparently

changed. Thus, some students may be selected because of the politics or differences in judging competencies.

Several generalizations can be made regarding the above ASB examples. First, they are exceptions to the rule and not the rule. Many judges are conscientious, capable music educators who are able to identify the best instrumental students in the state. As there are good and bad private teachers, there may also be good and bad judges. Collectively, of all the items studied relating to MI, only 2% of the 35% (Guttman's) is affected by ASB.

7. **Most HS music activities do not have a positive impact on student's MI.**

Activities such as ASO, ASJB, ASC, CF, MC, CCC, HSJB, and CB have very little impact on the student MI. These activities might have cultural, recreational, and social benefits, but when viewed statistically they do not seem to influence MI positively.

a. **All-state Orchestra, All-state Jazz Band, and All-state Choir (ASO, ASJB, ASC)** Music majors do not typically participate in ASO, ASJB, or ASC (17%, 6%, and 5%, respectively). The students did not rate these activities as important in developing MI (see Appendix B). There is a strong relationship between years of participation in ASO and the number of years the student participated in PL and CCC. In addition, there is a strong negative relationship between ASC and the number of years the student participated in CF and MC, and a negative relationship between the student ratings of CF and HSJB. The Pearson Product Moment (PPM) statistic suggested that the number of years a student participated in ASO moderately impacts MI (9%) and that the student ratings of ASO (23%) and ASJB (15%) impacts MI. The Guttman's Partial Correlation (GPC) analysis suggests that these three activities really do not impact MI.

Typically, students do not prepare or audition specifically for these music activities. Usually, after students are accepted to ASB, they become eligible to audition/qualify for ASO or ASJB. Therefore, the educational advantages are difficult to separate between ASB and the other two instrumental state activities. Since the study's analysis suggests that ASC does not have a meaningful impact on MI, the musical uniqueness of this activity will not be discussed.

b. **Concert Festival (CF)** Seventy-seven percent of the MMs participated in CF. Is CF an important music activity in developing MI? Students rated it 4th in importance in developing MI of the 11 activities, and the top MI students participated more than three years in this activity.

There are pros and cons for promoting CF. Music educators may validate this music activity by claiming that students (1) need to prepare for it several months in advance (long term commitment), (2) have to play and work in a large instrumental ensemble, (3) are exposed to some very demanding musical literature, and (4) are evaluated by an external panel of experts. Alternatively, when the PPM, GPC and SR statistical analyses are examined, the results suggest that CF has a very small impact on MI. Why?

c. **Marching Contests (MC)** Although most students participated in MC (82%), students rate it very low in developing MI. Why? The Stepwise statistic indicated that the student ratings of MC had a negative impact on MI and the Guttman's Partial Correlation statistic confirmed that the student ratings of MC actually had a negative impact on MI. How can a reasonable music educator expect students to have MI growth when they are expected to practice a 6-minute performance (half-time show) for three to six months? Typically in all but the finest HS marching bands, the dynamic range for MC music ranges from loud to very loud, the tempo ranges from fast to very fast, and more instructional time is spent on the techniques and refinement of marching skill rather than on the development of MI skills. Since only elementary aspects of MI are emphasized during MCs, it is no wonder that the analysis indicates almost no positive relationship between MC and MI.

d. **Church Community Choir (CCC)** Of the 11 music activities, CCC is the lowest rated and one of the least participated activities of the 11 HS music activities. The CCC activity is different from the other 10 activities for it does not require students to perform on their instrument. Since there is a strong relationship between the number of years a student participates in CCC and the number of years a student participates in ASO (Appendix E, r=.42), does this indicate that playing in an orchestra and singing are closely related? Singing closely parallels the instrumental performance of a musical phrase and is one of the fundamental ingredients in playing music. In addition, there is a strong relationship between the number of years a student plays in ASO and the number of years the student took PLs (r=.41). This might indicate that the student learns "real" musicianship or artistry from the private teacher and not from the band director in the band class.

The students did not value CCC's importance in developing MI. Since both top and bottom MI students participated in it equally, CCC should not be used as an indicator of the student's MI potential. The PPM, GPC, and the SR statistical treatments indicated no relationship between any aspects of CCC and MI.

e. **High School Jazz Band (HSJB) and Community Band (CB)** Typically, many music majors do not participate in HSJB or in CB (65%, 49%, respectively). Both activities were rated low by the students in importance in developing MI. Interestingly, the lowest MI student rated these activities significantly higher than the top MI students. Since the PPM analysis reflected a negative relationship between the number of years a student participates in HSJB and the student's ratings of PL (r= -.43), could this indicate that students might be forced into choosing between PL and HSJB (one an educational activity and the other a recreational activity)? The GPC statistic indicated that the number of years a student participates in CB actually had a large negative impact on outcome.

Students who are striving to develop their MI skills might use their time more wisely by participating in some other music activity such as PL, ASB, SE, or practicing at home on their instrument. These activities should be called "recreational" activities and not classified as musical activities that develop or enhance the student's MI.

**8. Student's MI consists of a variety of musical skills.**

The four musical skills with the strongest positive relationship with MI are Melody Recognition (MAT3 ST2), Pitch Recognition (MAT3 ST3), Musical Style (MAT4 ST1 ), and Auditory-Visual Discrimination (MAT4 ST2) (see Appendix D). Also, all the other MAT3 and MAT4 subtests have a positive relationship to MI. This suggests that other musical skills such as Tonal Memory (MAT3 St1), Instrument Recognition (MAT3 ST4), Chord Recognition (MAT4 ST3 and ST4), and Cadence Recognition (MAT4 ST5) are also part of the MI fabric. There is a strong relationship between both MAT3 and MAT4 and the student's MI. All of the musical skills tested by Colwell's two musical achievement tests are positively connected to the student MI level.

Where are students learning most of the skills tested by the MAT3 and MAT4? There seems to be a strong positive relationship between ASB, PLs, and SE and the student's MI. In ASB as well as PLs, students need to master both lower and higher level musical skills. In SE, the student applies, in an individual or ensemble setting, the full spectrum of musical skills. The musical denominators essential in participating in these three high school music activities could be defined, using Colwell's terminology, as melodic skills, pitch skills, musical (artistry) interpretation skills, and auditory-visual (reading the music) skills.

This study's analysis also suggests that some high school music activities such ASJB, ASC, MC, CCC, and CB do not develop MI skills. In these activities, students do not need to master the music fundamentals or develop higher level musical skills.

From an education perspective, there appears to be a distinct difference between an education activity and a recreational activity. In some instances, participating in MC may be nothing more than an extension of the cheering section at a sports activity; ASJB is where students perform more popular music; CB is where a student can perform band music for fun. The primary purpose of a CB is to perform for community activities and develop some positive social experiences with other high school students and/or adult amateur musicians. Generally, the main emphasis of Community Band is more recreational than educational. Finally, in CCC or ASC, there is some limited overlap between singing skills and instrumental skills. To become musically independent on a band instrument, the student needs to master the instrument and all of the fundamental skills associated with artistry. A vocal experience is not a valid substitute for an instrumental performance when measuring instrumental performance outcomes

**9. Participation combined with selected character attributes might be an excellent indicator of MI potential.**

High outcome music students participated in approximately three more years of music activities than the instrumentalists in the other outcome levels (Appendix C, p. 2). Years of participation does not assure MI growth. Instrumental students need to take lessons from competent instrumental teachers and practice consistently.

Participation indicators along with student ratings are insufficient in determining a student's MI potential. Musical achievement is a very complex issue. The bottom MI students did participate more in ASJB, ASC, and CCC, and reflected high ratings for ASJB, ASC, CF, SE, MC, CCC, HSJB, and CB –8 of 11 activities.

Some music educators claim that weak students lack "talent" while top MI students are talented. Here, the term "talent" is being abused. Students, parents, private teachers, and band directors who do not understand the importance of developing fundamental skills may blame the student's success or failure on some in-born talent. When people explain a student's success only in terms of talent, they are reflecting their lack of understanding of developing MI excellence.

10. **The Insignificance of significance: the researcher's selection of a statistical treatment has a large impact on the study's conclusions.**

When an ERIC word search was conducted on October 17, 1993 using the term "predictor variable", there were 6185 ERIC documents identified. Further, 408 ERIC documents were found using "predictor variables" and "correlations", 110 documents with "predictor variables" and "Multiple Regression", 10 documents with "predictor variables" and "Stepwise Regression", and 4 documents with "predictor" variables" and "partial correlation". Is there a preferred statistical treatment when evaluating predictor variables and student outcome?

This study used a variety of statistical treatments in trying to examine a very complex issue. As the Shapiro Wilk W test illustrated in Appendix B, most of the study's items are not normally distributed, and therefore the assumptions of *random selection* and *normal distribution* are violated. Next, there was a great contrast between the Student's t-test and Scheffe data analysis; the first appears liberal and the second appears conservative. In addition, although the Student's and Scheffe did not identify differences between the outcome groups, the permutation statistic noted possible differences (Appendix C, p. 2, Student's ratings for CB).

Identifying positive and negative relationships between independent variables and the dependent variable (student outcome) is difficult. As this study suggests, the weakness of using the Pearson Product Moment statistical treatment is that many of the study's items overlap, or are not discrete. Further, when the percentage of variance was summed, it exceeded 100%. The primary contribution of using the Guttman's Partial Correlation statistical treatment is that it attempted to eliminate the overlap between the independent variables before it was used to compute the "true" relationship between the independent and dependent variable. The Stepwise Regression (Forward) selected items at a .05 level of significance. Using this statistical technique, 2 items were identified (11%) from a pool of 22 items, and 20 items were excluded. When summed, the study's items accounted for 11% of the variance between the independent

variables and the dependent variable. Finally, the Multiple Regression statistic makes the the assumption that all the items have an impact on the dependent variable. The resulting analysis of the Multiple Regression statistic indicated that the adjusted $r^2$ accounted for 7% of the things that impact student outcome.

The reader, while first examining this report, might think that much of the statistical treatments are unnecessary. Hopefully, after examining and reflecting on the study's data analysis, he/she might realize that many of the conclusions are insignificant, because most of the things that impact student outcome were not identified.

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**Authors Notes**

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Additional research papers will be forthcoming from this study examining other postsecondary issues such as: (a) College Music Activities (What do good musicians emphasize during practicing, private lessons, and in the band class--scales, etudes, thirds, arpeggios, band music, sight-reading, solos, and improvisation), and (b) Musicianship (What do good musicians emphasize--tone, intonation, phrasing, technique, dynamics, rhythm, form, etc--to develop musicianship during practicing, band rehearsals, and private lessons?). After each of the five sections have been reported to educational conferences, additional projects will report comparisons between each of the five research areas (i.e., General Demographic vs. College Courses, or High School Music Activities vs. College Music Activities, etc.).

# INSTRUMENTAL COLLEGE SURVEY-2

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## A. General

**Social Security Number**_____ **Instrument** _____

1. Instrumental Organization _____
2. College rank: (Fr) (So) (Jr) (Sr) (Masters) (Doctoral)
3. College major: Music ( ), Non-music ( )
4. Total years you have played your band instrument (*grade school to present*): _____
5. What grade did you start band?_____

- Gender (M ) (F )
- College GPA _____
- Age _____

## B. College Course Work

1. How many hours a week do you:
   a. Practice Instrument _____
   b. Study non-music course work _____
2. Number of semester (quarter) classes you have completed in each area
3. Your average grade in each area (*A-B-C-D-F*)

*Using the following scale for Questions 4-5,*
***RATE** each activity as to its importance in:*

| | Private (Inst.) Lessons | Ear training | Theory | Keyboard/Piano | Music History | Conducting | Music Education | Voice/Choir | Inst. Ensemble | General Academic |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 5 VERY important 4 Important 3 Somewhat Important 2 Little Importance 1 NOT important | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

4. Developing musicianship
5. In your opinion, how would the music faculty **RATE** each area's importance?
6. The music course(s) that helped your musicianship the **most**? _____
   _____ **Least**? _____

## C. High School Music Activities

1. High school GPA _____
2. ACT score _____ SAT score _____
3. Excellent high school musicians emphasize _____
4. How many **YEARS** did you participate in each of these high school activities?

*Using the following scale for Questions 5-6,*
***RATE** each activity as to its importance in developing **MUSICIANSHIP**:*

5. Your **Musical Development**
6. In your opinion, how would your high school **Band Director** rate each area's importance?

| | All-State Band | All-State Orchestra | All-State Jazz Band | All-State Choir | Concert Festival | Solo-Ensemble | Marching Contests | Private Lessons | Church/Community Choir | High School Jazz Band | Community Band |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 5 Very important 4 Important 3 Somewhat Important 2 Little Importance 1 Not important | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

**OVER**

## D. College Music Activities

1. The percentage (%) of time you use a metronome during practicing?_____

**Make sure Questions 2 and 3 each add up to 100%**

What percentage (%) of time do you spend on the following activities during:

2. **Individual Practicing**
3. **Private Lessons** (*Major Inst.*)

*Using the following scale for Questions 4-6*, give YOUR PERCEPTION of how the following individuals would **RATE** each activity's importance in developing **MUSICIANSHIP**:

4. **Yourself**
5. Your private instrumental **Teacher**
6. Your college **Band Director**

| Scales | Etudes | Thirds/Arpeggios | Band Music | Sight-reading | Solos | Improvisation | Other | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | =100% |
| | | | | | | | | =100% |

5 VERY Important, 4 Important,
3 Somewhat Important, 2 Little Importance,
1 NOT Important

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

7. Number of minutes per month you make a audio/video recording of your playing _____
8. Number of minutes per week you ask a **classmate/friend/faculty member** (*exclude private instrument teacher*) to listen/critique your instrument playing _____

## E. Musicianship

**Make sure Questions 1, 2, and 3 each add up to 100%**

What percentage (%) of time is spent practicing / thinking about these music items during:

1. **Individual Practicing?**
2. **Band Rehearsal?**
3. **Private Lessons ?**

*Using the following scale for Questions 4-5, **RATE** each activity in developing musicianship from the following perspectives:*

4. Its **importance**
5. How **Difficult** is it to learn/master

| Tone | Intonation | Phrasing | Ensemble | Technique | Dynamics | Rhythm | History | Form | Theory | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | =100% |
| | | | | | | | | | | =100% |
| | | | | | | | | | | =100% |

5 VERY Important Difficult, 4 Important Difficult
3 Somewhat Important, 2 Little Importance
1 NOT Important Difficult

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

6. When Performing, **excellent** instrumental musicians listen to/emphasize_____
while **poor** instrumental musicians listen to/emphasize _____

# Appendix B

## Music Majors

**n=276**

*Ball State U., Florida State U., and Wichita State U. (Spring,1992 data)*

### Student's Academic Profile

| HS Academic Outcomes | N | Mean | SD | Kurtosis | Skewness | Shapiro-Wilk | p | |
|---|---|---|---|---|---|---|---|---|
| 1 High School GPA | 259 | 3.34 | 0.48 | 1.90 | -1.06 | 0.93 | .000 | |
| 2 ACT Score | 118 | 25.1 | 3.89 | -0.70 | -0.30 | 0.95 | .001 | |
| 3 SAT Score | 165 | 1065.6 | 153.7 | -0.30 | 0.06 | 0.98 | .636 | * |

* Normally Distributed

### Student's High School Music Activities

**YEARS of Participation**

| HS Music Activities | N | MEAN | SD | Median | Z-Score | Rank | >1 year | % Participation | Kurtosis | Skewness | Shapiro-Wilk | p |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 All State Band (ASB) | *274* | 1.0 | 1.2 | 0 | -0.5 | 4 | 131 | 48% | 0.7 | 1.23 | .75 | .00 |
| 2 All State Orch. (ASO) | *274* | 0.3 | 0.8 | 0 | -1.0 | 3 | 46 | 17% | 15.0 | 3.67 | .42 | .00 |
| 3 All State Jazz B. (ASJB) | *274* | 0.1 | 0.4 | 0 | -1.2 | 2 | 17 | 6% | 34.5 | 5.48 | .26 | .00 |
| 4 All State Choir (ASC) | *274* | 0.1 | 0.4 | 0 | -1.2 | 1 | 15 | 5% | 45.1 | 6.29 | .23 | .00 |
| 5 Concert Festival (CF) | *274* | 2.9 | 1.9 | 4 | 0.9 | 8 | 210 | 77% | -0.9 | -0.29 | .83 | .00 |
| 6 Solo Ensemble (SE) | *275* | 3.6 | 1.6 | 4 | 1.5 | 11 | 257 | 93% | 0.5 | -0.30 | .88 | .00 |
| 7 Marching Contest (MC) | *274* | 3.1 | 1.8 | 4 | 1.1 | 10 | 226 | 82% | 4.1 | 0.12 | .80 | .00 |
| 8 Private Lessons (PL) | *274* | 2.9 | 3.2 | 3 | 1.0 | 9 | 215 | 78% | 60.4 | 5.80 | .66 | .00 |
| 9 Church/Com. Choir (CCC) | *275* | 1.2 | 2.0 | 0 | -0.3 | 6 | 107 | 39% | 7.2 | 2.25 | .67 | .00 |
| 10 High Sch. Jazz Band (HSJB) | *274* | 1.2 | 1.6 | 2 | 0.1 | 7 | 178 | 65% | -1.4 | 0.19 | .82 | .00 |
| 11 Community Band (CB) | *275* | 1.0 | 1.4 | 0 | -0.5 | 5 | 128 | 47% | 0.5 | 1.26 | .73 | .00 |

### PERCEPTIONS

**Student's Rating in Developing Musicianship**

| HS Music Activities | MEAN | SD | Median | Z-Score | Rank | Shapiro-Wilk | p |
|---|---|---|---|---|---|---|---|
| 1 All State Band (ASB) | 3.8 | 1.2 | 4.0 | 0.3 | 9 | .80 | .00 |
| 2 All State Orch. (ASO) | 3.7 | 1.4 | 4.0 | 0.1 | 7 | .78 | .00 |
| 3 All State Jazz B. (ASJB) | 3.2 | 1.5 | 3.0 | -0.7 | 4 | .83 | .00 |
| 4 All State Choir (ASC) | 3.2 | 1.5 | 3.0 | -0.7 | 3 | .84 | .00 |
| 5 Concert Festival (CF) | 3.8 | 1.1 | 4.0 | 0.3 | 8 | .83 | .00 |
| 6 Solo Ensemble (SE) | 4.6 | 0.7 | 5.0 | 1.6 | 10 | .62 | .00 |
| 7 Marching Contest (MC) | 3.0 | 1.3 | 3.0 | -1.0 | 2 | .88 | .00 |
| 8 Private Lessons (PL) | 4.8 | 0.6 | 5.0 | 1.9 | 11 | .39 | .00 |
| 9 Church/Com. Choir (CCC) | 3.0 | 1.2 | 3.0 | -1.1 | 1 | .89 | .00 |
| 10 High Sch. Jazz Band (HSJB) | 3.6 | 1.1 | 4.0 | 0.0 | 6 | .86 | .00 |
| 11 Community Band (CB) | 3.2 | 1.2 | 3.0 | -0.7 | 5 | .88 | .00 |

Box ≤ 1.00 z-score
Bold = ≥ 1.00 z-score



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Appendix C

## Inferential Analysis

**Questions 1-3: What was your High School GPA, ACT score, and SAT score?**

*a priori* | *a posteriori*

| High School Academic Profile | Academic Mean Scores by Outcome groups: High | | Med. High | Average | Med. Low | Low | | Brown-Forsythe Homogeneity of Variance: F Ratio | Prob>F | Welch Anova (F): | | One Way Anova: F Ratio | Prob>F | post hoc: Student's t (T) | Scheffe (A) | Permutation: p | Range |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *n=* | *259* | | *45* | | *87* | *54* | *47* | *26* | | | | | | | | | | | |
| 1 High School GPA | 3.48 | | 3.40 | 3.37 | 3.25 | 3.02 | | 3.41 | .010 | | | 4.86 | .001 | 1,3,7,9 | 4,7 | ≤.01 | H - L |
| *n=* | *188* | | 27 | | 56 | 34 | 56 | 15 | | | | | | | | | | | |
| 2 SAT score | 1150 | | 1095.8 | 1062 | 1007 | 937.3 | | 1.88 | .117 | | | 7.36 | .000 | 2,3,4,6,7,9 | 3,4,7 | ≤.01 | H - L |
| *n=* | *118* | | *25* | | *39* | *27* | *16* | *11* | | | | | | | | | | | |
| 3 ACT | 26.6 | | 25.3 | | 25.0 | 23.5 | 23.5 | | 0.30 | .876 | | | 2.34 | .059 | 3, 4 | – | ≤.05 | H - ML | |

**Question #3: How many YEARS did you participate in each of these high school activities?**

| HS Music Activities | Years Mean years of participation/activity | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 All State Band (ASB) | 1.44 | 8 | 1.10 | 0.91 | 0.37 | 0.85 | 4 | 4.94 | .001 | | | 5.41 | .000 | 2,3,4,7,10 | 3,6 | ≤.05 | H - ML |
| 2 All State Orch. (ASO) | 0.46 | 1 | 0.31 | 0.33 | 0.08 | 0.26 | 3 | 1.48 | .208 | | | 1.48 | .208 | 3 | – | -- | -- |
| 3 All State Jazz B. (ASJB) | 0.13 | 2 | 0.08 | 0.07 | 0.08 | 0.22 | 1.5 | 0.72 | .578 | | | 0.72 | .578 | – | – | -- | -- |
| 4 All State Choir (ASC) | 0.13 | 2 | 0.10 | 0.04 | 0.04 | 0.22 | 1.5 | 1.06 | .377 | | | 1.06 | .377 | – | – | -- | -- |
| 5 Concert Festival (CF) | 3.13 | 8 | 2.84 | 2.63 | 2.85 | 2.89 | 9 | 0.51 | .729 | | | 0.43 | .787 | – | – | -- | -- |
| 6 Solo Ensemble (SE) | 3.90 | 11 | 3.40 | 3.47 | 3.69 | 3.63 | 11 | 0.49 | .743 | | | 0.89 | .468 | – | – | -- | -- |
| 7 Marching Contest (MC) | 3.29 | 9 | 3.06 | 2.82 | 3.23 | 3.15 | 10 | 0.51 | .729 | | | 0.56 | .691 | – | – | -- | -- |
| 8 Private Lessons (PL) | 3.35 | 10 | 2.56 | 3.09 | 3.17 | 2.63 | 8 | 1.30 | .271 | | | 0.70 | .594 | – | – | -- | -- |
| 9 Church/Com. Choir (CCC) | 1.44 | 6 | 0.98 | 1.42 | 0.87 | 1.74 | 7 | 1.59 | .176 | | | 1.51 | .200 | – | – | -- | -- |
| 10 High Sch. Jazz Band (HSJB) | 1.90 | 7 | 1.91 | 1.82 | 1.69 | 1.96 | 8 | 0.46 | .768 | | | 0.35 | .842 | – | – | -- | -- |
| 11 Community Band (CB) | 1.08 | 4 | 0.92 | 1.23 | 0.92 | 1.19 | 5 | 0.68 | .604 | | | 0.58 | .680 | – | – | -- | -- |
| Sum= | 20.23 | | 17.25 | 17.84 | 16.98 | 18.33 | | | | | | | | | | | |
| Mean= | 1.84 | | 1.57 | 1.62 | 1.54 | 1.67 | | | | | | | | | | | |

1-**Brown-Forsythe**: Test for homogeneity of variance.
2-**Welch-Anova**: Evaluate groups of means with different variance.
3-**Student's t test**: A liberal statistical analysis for identifying differences between groups.
**Scheffe**: A conservative statistical analysis for identifying differences between groups.

**Mean Scores**
Box = Largest Mean Score; and Shaded = Smallest Mean score.
**Variance and Category Analysis**
Bold/Box = significant difference ($p \leq .05$)

**Student's & Scheffe**

| | |
|---|---|
| 1=High & Med. High | 6=Med. High & Med. Low |
| 2=High & Average | 7=Med. High & Low |
| 3=High & Med. Low | 8=Average & Med. Low |
| 4=High & Low | 9=Average & Low |
| 5=Med. High & Average | 10=Med. Low & Low |



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**Question #5: From your perspective (student's), rate each activity in developing musicianship.**

| HS Music Activities | Student's: Mean Rating High | Rank | Med. High | Average | Med. Low | Low | Rank | Brown-Forsythe Homogeneity of Variance F Ratio | Prob>F | Welch Anova | | One Way Anova F Ratio | Prob>F | post hoc Student's t | Scheffe | Permutation p | Range |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 All State Band (ASB) | 4.10 | 9 | 3.82 | 3.78 | 3.59 | 4.05 | 7 | 0.34 | .852 | 1.20 | .311 | 1.17 | .327 | 3 | -- | ≤.05 | H - ML |
| 2 All State Orch. (ASO) | 3.92 | 8 | 3.78 | 3.70 | 3.28 | 3.81 | 6 | 0.06 | .994 | 0.83 | .511 | 0.88 | .493 | -- | -- | ≤.05 | H - ML |
| 3 All State Jazz B. (ASJB) | 3.19 | 3 | 3.26 | 2.92 | 3.25 | 3.56 | 5 | 0.66 | .620 | 0.87 | .468 | 0.45 | .773 | -- | -- | -- | -- |
| 4 All State Choir (ASC) | 3.38 | 4 | 3.23 | 2.90 | 3.08 | 3.60 | 4 | 0.30 | .876 | 0.83 | .573 | 0.62 | .652 | -- | -- | -- | -- |
| 5 Concert Festival (CF) | 3.82 | 7 | 3.80 | 3.56 | 4.02 | 4.36 | 9 | 1.19 | .318 | 3.24 | .014 | 2.90 | .023 | 4,7,8,9 | -- | -- | -- |
| 6 Solo Ensemble (SE) | 4.45 | 10 | 4.66 | 4.52 | 4.63 | 4.71 | 10 | 1.02 | .397 | 0.88 | .493 | 1.02 | .397 | -- | -- | -- | -- |
| 7 Marching Contest (MC) | 2.67 | 1 | 2.82 | 2.85 | 3.58 | 3.88 | 8 | 0.46 | .763 | 5.89 | .000 | 6.45 | .000 | 3,4,6,7,8,9 | 3,4,6,7,9 | ≤.01 | H - L |
| 8 Private Lessons (PL) | 4.96 | 11 | 4.79 | 4.78 | 4.67 | 4.86 | 11 | 1.337 | .257 | 1.44 | .251 | 1.34 | .257 | 3 | -- | ≤.05 | H - ML |
| 9 Church/Com. Choir (CCC) | 3.16 | 2 | 2.80 | 2.74 | 3.19 | 3.53 | 1 | 0.734 | .570 | 2.60 | .064 | 2.15 | .076 | 7,9 | -- | -- | -- |
| 10 High Sch. Jazz Band (HSJB) | 3.10 | 3 | 3.62 | 3.51 | 4.08 | 4.15 | 6 | 1.957 | .102 | 5.04 | .001 | 5.02 | .001 | 1,3,4,6,8,9 | 3,4 | ≤.01 | H - L |
| 11 Community Band (CB) | 3.06 | 2 | 3.08 | 3.24 | 3.50 | 3.55 | 2 | 1.142 | .338 | 1.48 | .211 | 1.12 | .350 | -- | -- | ≤.01 | H - L |
| Sum= | 39.6 | | 39.6 | 38.5 | 40.8 | 44.1 | | | | | | | | | | | |
| Mean= | 3.60 | | 3.60 | 3.50 | 3.71 | 4.01 | | | | | | | | | | | |

**Mean Scores**
Box = Largest Mean Score, and Shaded = Smallest Mean score
**Variance and Category Analysis**
Bold/Underline = significant difference (ps.05)

| | |
|---|---|
| 1=High & Med. High | 6=Med. High & Med. Low |
| 2=High & Average | 7=Med. High & Low |
| 3=High & Med. Low | 8=Average & Med. Low |
| 4=High & Low | 9=Average & Low |
| 5=Med. High & Average | 10=Med. Low & Low |



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Appendix D

## Correlation Matrix (Outcomes)

### Music Majors

*Ball State, Florida State, and Wichita State study (1992 data)*

**n=276**

| | MAT3 ST1 | MAT3 ST2 | MAT3 ST3 | MAT3 ST4 | MAT4 ST1 | MAT4 ST2 | MAT4 ST3 | MAT4 ST4 | MAT4 ST5 | MAT3 | MAT4 | GT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MAT3 ST1** | 1.00 | | | | | | | | | | | |
| **MAT3 ST2** | .321 | 1.00 | | | | | | | | | | |
| **MAT3 ST3** | **.381** | **.440** | 1.00 | | | | | | | | | |
| **MAT3 ST4** | .270 | *.226* | *.164* | 1.00 | | | | | | | | |
| **MAT4 ST1** | *.203* | .299 | **.335** | .326 | 1.00 | | | | | | | |
| **MAT4 ST2** | .229 | .315 | **.374** | *.178* | .311 | 1.00 | | | | | | |
| **MAT4 ST3** | *.227* | **.385** | .267 | *.160* | .239 | **.342** | 1.00 | | | | | |
| **MAT4 ST4** | **.345** | .279 | .248 | .248 | *.131* | .269 | *.214* | 1.00 | | | | |
| **MAT4 ST5** | .328 | .326 | .331 | *.182* | .258 | .319 | .237 | .356 | 1.00 | | | |
| **MAT3** | .69 | .77 | .79 | .47 | .41 | .41 | .39 | .39 | .43 | 1.00 | | |
| **MAT4** | .39 | .49 | .49 | .35 | .69 | .72 | .63 | .52 | .62 | .63 | 1.00 | |
| **GT** | .58 | **.68** | **.69** | .44 | **.63** | **.65** | .58 | .51 | .59 | .88 | .93 | 1.00 |

*Box = p≤.05 [r≤.232] (two-tailed test)*

**Bold = r ≥ .335 (p≤.01 level)**

Appendix E

# Pearson Product Moment Correlation

Correlation Matrix

| | | Colwell's MI Tests | | | Academic Indicators | | | Years of Participation | | | | | | | | Student's Ratings in developing "musicianship" | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GT (MAT3 + MAT4) | MAT3 | MAT4 | C1 GPA | C2a ACT | C2b SAT | C4 ASB | C4 ASO | C4 ASJB | C4 ASC | C4 CF | C4 SE | C4 MC | C4 PL | C4 CCC | C4 HSJB | C4 CB | C5 ASB | C5 ASO | C5 ASJB | C5 ASC | C5 CF | C5 SE | C5 MC | C5 PL | C5 CCC | C5 HSJB | C5 CB |
| 1 | GT | 1.00 | .91 | .94 | .00 | .29 | .53 | .40 | .29 | • | -.15 | .21 | .05 | -.09 | .09 | .12 | .17 | .08 | .45 | .48 | .39 | .30 | .28 | -.16 | -.36 | .19 | .25 | .02 | .08 |
| 2 | MAT3 | .91 | 1.00 | .70 | .11 | .32 | .46 | .23 | .36 | • | -.33 | .20 | .03 | .06 | .10 | .18 | .14 | .07 | .40 | .46 | .35 | .19 | .34 | -.04 | -.28 | .27 | .19 | -.03 | -.19 |
| 3 | MAT4 | .94 | .70 | 1.00 | -.09 | .23 | .51 | .47 | .20 | • | -.01 | .16 | .07 | .19 | .07 | .00 | .17 | .10 | .43 | .43 | .37 | .26 | .15 | -.23 | -.34 | .10 | .27 | .06 | .36 |
| 4 | C1 GPA | .00 | .11 | -.09 | 1.00 | .59 | .42 | .19 | .06 | • | -.33 | -.20 | -.08 | .48 | -.12 | -.07 | -.10 | -.11 | .02 | .16 | .01 | .16 | .41 | .31 | .10 | .03 | .00 | .14 | -.06 |
| 5 | C2a ACT | .29 | .32 | .23 | .59 | 1.00 | .78 | .09 | .22 | • | -.32 | -.09 | -.05 | .42 | -.03 | -.13 | .01 | -.26 | .40 | .41 | .47 | .33 | .34 | .06 | .02 | -.28 | .09 | .07 | -.14 |
| 6 | C2b SAT | .53 | .46 | .51 | .42 | .78 | 1.00 | .28 | .18 | • | -.44 | -.57 | -.14 | .46 | .00 | -.02 | -.39 | -.20 | .45 | .46 | .49 | .31 | .41 | -.35 | -.16 | -.34 | .00 | .37 | -.07 |
| 7 | C4 ASB | .40 | .23 | .47 | .19 | .09 | .29 | 1.00 | -.03 | • | -.19 | -.28 | -.06 | -.13 | -.26 | -.02 | -.39 | -.18 | -.39 | -.27 | -.44 | -.18 | -.17 | -.04 | -.08 | .31 | .02 | .23 | .37 |
| 8 | C4 ASO | .29 | .36 | .20 | .06 | .22 | .18 | -.03 | 1.00 | • | -.11 | -.19 | -.20 | -.12 | .41 | .42 | -.17 | -.25 | -.34 | -.22 | -.34 | -.24 | -.06 | -.36 | -.11 | .19 | .29 | -.02 | -.44 |
| 9 | C4 ASJB | • | • | • | • | • | • | • | • | 1.00 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 10 | C4 ASC | -.15 | -.33 | .01 | -.33 | -.32 | -.44 | -.19 | -.11 | • | 1.00 | -.46 | .20 | -.33 | .14 | -.15 | -.31 | -.01 | -.38 | -.28 | -.31 | -.17 | -.54 | .16 | -.34 | .14 | -.36 | -.46 | .43 |
| 11 | C4 CF | .21 | .20 | .18 | .65 | .59 | .57 | .28 | -.19 | • | -.46 | 1.00 | .32 | .51 | -.38 | -.06 | -.01 | -.03 | .38 | .36 | .18 | .10 | .82 | .04 | .10 | .08 | .10 | .44 | .08 |
| 12 | C4 SE | .05 | .03 | .07 | .06 | -.09 | -.14 | .08 | -.32 | • | .20 | .32 | 1.00 | -.02 | .00 | .09 | -.23 | .00 | -.38 | -.48 | -.31 | -.28 | .06 | .83 | .10 | .42 | .00 | .26 | .21 |
| 13 | C4 MC | -.09 | .06 | -.19 | .48 | .42 | .46 | .13 | -.12 | • | -.33 | .51 | -.02 | 1.00 | -.03 | .19 | .32 | -.22 | .19 | .07 | .03 | .34 | .36 | .07 | .36 | -.22 | .12 | .31 | -.24 |
| 14 | C4 PL | .09 | .10 | .07 | -.12 | -.03 | .08 | .26 | .41 | • | .14 | -.38 | .00 | -.03 | 1.00 | .35 | .19 | .36 | -.37 | -.23 | -.08 | -.03 | -.42 | -.19 | -.07 | .17 | .31 | .08 | -.12 |
| 15 | C4 CCC | .12 | .15 | .09 | -.07 | -.12 | .02 | -.02 | .42 | • | -.15 | -.05 | .38 | .19 | .35 | 1.00 | -.17 | .53 | -.06 | -.20 | -.10 | -.20 | -.03 | .18 | .32 | .36 | .37 | -.01 | -.24 |
| 16 | C4 HSJB | .17 | .14 | .17 | -.10 | .01 | .29 | .38 | -.17 | • | -.31 | -.01 | -.23 | .33 | .10 | -.17 | 1.00 | .19 | .08 | .03 | .07 | .06 | .17 | -.39 | .07 | .43 | .37 | .21 | -.13 |
| 17 | C4 CB | .09 | .07 | .10 | -.10 | -.26 | -.03 | .16 | -.29 | • | -.01 | -.02 | .50 | .22 | .25 | .53 | .19 | 1.00 | .13 | .20 | .19 | .21 | .05 | .34 | .20 | .36 | .12 | .37 | .37 |
| 18 | C5 ASB | .45 | .40 | .43 | .03 | .45 | .62 | .29 | .24 | • | -.39 | .25 | -.25 | .13 | -.17 | -.05 | .09 | -.13 | 1.00 | .92 | .94 | .80 | .55 | .28 | -.12 | .02 | .48 | .17 | .06 |
| 19 | C5 ASO | .48 | .46 | .43 | .16 | .51 | .60 | .24 | .32 | • | -.38 | .26 | -.45 | .07 | -.23 | -.20 | .03 | -.29 | .92 | 1.00 | .92 | .75 | .56 | .45 | -.31 | -.10 | .05 | .51 | .00 | .01 |
| 20 | C5 ASJB | .39 | .35 | .37 | .01 | .47 | .49 | .34 | .34 | • | -.31 | .16 | -.31 | .03 | -.09 | -.10 | .07 | -.19 | .94 | .92 | 1.00 | .86 | .45 | .31 | .03 | .06 | .42 | .15 | .04 |
| 21 | C5 ASC | .30 | .19 | .35 | -.16 | .32 | .31 | .19 | .26 | • | .17 | -.10 | -.25 | -.34 | -.03 | -.20 | -.05 | -.21 | .80 | .75 | .86 | 1.00 | .18 | -.08 | -.20 | .10 | .24 | -.08 | .23 |
| 22 | C5 CF | .28 | .34 | .19 | .41 | .35 | .41 | .17 | -.06 | • | -.54 | .62 | .06 | .35 | -.62 | -.03 | .17 | -.05 | .55 | .56 | .45 | .18 | 1.00 | .06 | .11 | -.06 | .54 | .17 | -.19 |
| 23 | C5 SE | -.16 | -.04 | -.23 | .21 | -.05 | -.35 | -.04 | -.39 | • | .16 | .04 | .53 | .07 | -.19 | .15 | -.29 | .34 | -.22 | -.31 | -.21 | -.08 | .06 | 1.00 | .22 | .80 | .04 | .04 | .34 |
| 24 | C5 MC | -.36 | -.28 | -.38 | .10 | .02 | -.16 | -.05 | -.11 | • | -.34 | .10 | .10 | .38 | -.07 | .32 | .01 | .40 | -.12 | -.10 | .02 | -.20 | .11 | .22 | 1.00 | .14 | .32 | .38 | -.10 |
| 25 | C5 PL | .19 | .27 | .10 | .03 | -.26 | -.34 | .24 | .13 | • | .14 | .02 | .42 | -.22 | .17 | .35 | -.43 | .38 | -.02 | -.05 | .05 | .10 | -.08 | .50 | .14 | 1.00 | .30 | .08 | .34 |
| 26 | C5 CCC | .25 | .19 | .27 | .00 | -.09 | .09 | .09 | .23 | • | -.38 | .10 | -.20 | .12 | -.31 | .37 | -.27 | .13 | .48 | .51 | .42 | .24 | .39 | -.04 | .28 | .30 | 1.00 | -.03 | .19 |
| 27 | C5 HSJB | .02 | -.03 | .06 | .14 | .07 | .27 | .62 | -.34 | • | -.46 | .44 | .25 | .51 | .08 | -.01 | .54 | .37 | .17 | .00 | .15 | -.08 | .17 | -.04 | .36 | .06 | -.03 | 1.00 | .19 |
| 28 | C5 CB | .08 | -.18 | .28 | -.05 | -.14 | -.07 | .31 | -.48 | • | .43 | .08 | .21 | -.24 | -.12 | -.24 | -.13 | .37 | .06 | .01 | .04 | .26 | -.15 | .24 | -.10 | .34 | .15 | .19 | 1.00 |

Box = r ≥ .40
Shade = r ≥ -.40



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Appendix F

| | | Pearson Product Moment Correlation | | | | Guttman's Partial Correlation | | | | Difference | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pearson "r" | r^r | Z-Score | Rank | Guttman's "r" | r^r | Z-Score | Rank | % | Z-Score | Rank |
| | **Years of Participation** | | | | | | | | | | | |
| 1 | **C4 ASB** | .40 | 15.6% | 0.84 | 19 | **.170** | **2.9%** | 0.37 | **20** | **12.7%** | 0.47 | 17 |
| 2 | **C4 ASO** | .29 | 8.6% | -0.06 | 15 | -.040 | 0.2% | 0.08 | **9** | **8.4%** | -0.14 | 12 |
| 3 | **C4 ASJB** | • | • | •• | | **-.186** | **3.5%** | **1.09** | **22** | • | • | • |
| 4 | **C4 ASC** | -.15 | 2.4% | -0.85 | 8 | -.114 | 1.3% | 0.56 | **18** | 1.1% | **-1.41** | 3 |
| 5 | **C4 CF** | .21 | 4.3% | -0.60 | 12 | .002 | 0.0% | -0.16 | **1** | 4.3% | -0.44 | 7 |
| 6 | **C4 SE** | .05 | 0.3% | **-1.12** | 2 | -.012 | 0.0% | -0.68 | **5** | 0.3% | -0.44 | 8 |
| 7 | **C4 MC** | -.09 | 0.7% | **-1.06** | 4 | .019 | 0.0% | -0.47 | **8** | 0.7% | -0.59 | 6 |
| 8 | **C4 PL** | .09 | 0.8% | **-1.05** | 5 | -.007 | 0.0% | 0.77 | **2** | 0.8% | **-1.82** | 2 |
| 9 | **C4 CCC** | .12 | 1.5% | -0.96 | 7 | -.042 | 0.2% | 0.37 | **10** | 1.3% | **-1.33** | 5 |
| 10 | **C4 HSJB** | .17 | 2.9% | -0.78 | 10 | .002 | 0.0% | -0.70 | **3** | 2.9% | -0.09 | 13 |
| 11 | **C4 CB** | .09 | 0.8% | **-1.04** | 6 | -.007 | 0.0% | -0.69 | **4** | 0.8% | -0.36 | 10 |
| | **Total** | | **38.0%** | | | | **8.0%** | | | | | |
| | **Student's Rating** | | | | | | | | | | | |
| 12 | **C5 ASB** | **.45** | 20.2% | **1.43** | 20 | -.094 | 0.9% | -0.36 | **15** | **19.3%** | **1.78** | 20 |
| 13 | **C5 ASO** | **.48** | 23.2% | **1.82** | 21 | .017 | 0.0% | -0.48 | **7** | **23.2%** | **2.30** | 21 |
| 14 | **C5 ASJB** | .39 | 15.2% | 0.79 | 18 | .045 | 0.2% | -0.12 | **11** | **15.0%** | 0.91 | 19 |
| 15 | **C5 ASC** | .30 | 9.1% | 0.01 | 16 | .096 | 0.9% | -0.10 | **16** | 8.1% | 0.11 | 15 |
| 16 | **C5 CF** | .28 | 7.8% | -0.15 | 14 | -.074 | 0.5% | -0.72 | **13** | 7.3% | 0.57 | 18 |
| 17 | **C5 SE** | -.16 | 2.5% | -0.83 | 9 | -.097 | 0.9% | -0.52 | **17** | 1.6% | -0.32 | 11 |
| 18 | **C5 MC** | -.36 | 13.1% | 0.52 | 17 | **-.173** | **3.0%** | 0.13 | **21** | 10.1% | 0.40 | 16 |
| 19 | **C5 PL** | .19 | 3.7% | -0.68 | 11 | .091 | 0.8% | -0.77 | **14** | 2.9% | 0.09 | 14 |
| 20 | **C5 CCC** | .25 | 6.4% | -0.34 | 13 | .060 | 0.4% | 0.10 | **12** | 6.0% | -0.43 | 9 |
| 21 | **C5 HSJB** | .02 | 0.0% | **-1.15** | 1 | .013 | 0.0% | 0.24 | **6** | **0.0%** | **-1.38** | 4 |
| 22 | **C5 CB** | .08 | 0.6% | **-1.08** | 3 | **-.145** | **2.1%** | **1.74** | **19** | **-11.5%** | **-2.82** | 1 |
| | **Total** | | **101.9%** | | | | **9.8%** | | | | | |

Appendix G

## Stepwise Regression

p≤.05

Analysis of Variance Table

| Source | DF: | Sum Squares: | Mean Square: | F-test: |
|---|---|---|---|---|
| REGRESSION | 2 | 3474.92 | 1737.46 | 7.997 |
| RESIDUAL | 119 | 25854.20 | 217.26 | |
| TOTAL | 121 | 29329.12 | | |

| Steps | Variable: | r | r^r | Adjusted: r^r | % of Variance | RMS Residual: |
|---|---|---|---|---|---|---|
| 1 | C5 MC | 0.275 | 0.076 | 0.068 | 6.8% | 15.03 |
| 2 | C5 CB | 0.344 | 0.118 | 0.104 | 10.5% | 14.74 |

### Variables Not in Equation

| | Variable: | Partial Correlation r | % of Variance r^r | F to Enter |
|---|---|---|---|---|
| 1 | C4 ASB | 0.119 | 1.4% | 1.697 |
| 2 | C4 ASO | -0.052 | 0.3% | 0.316 |
| 3 | C4 ASC | -0.130 | 1.7% | 2.022 |
| 4 | C4 CF | -0.040 | 0.2% | 0.188 |
| 5 | C4 SE | -0.067 | 0.4% | 0.539 |
| 6 | C4 MC | -0.001 | 0.0% | 0.000 |
| 7 | C4 PL | 0.030 | 0.1% | 0.104 |
| 8 | C4 CCC | -0.016 | 0.0% | 0.032 |
| 9 | C4 HSJB | 0.078 | 0.6% | 0.731 |
| 10 | C4 CB | -0.093 | 0.9% | 1.029 |
| 11 | C5 ASB | 0.059 | 0.3% | 0.418 |
| 12 | C5 ASO | 0.089 | 0.8% | 0.937 |
| 13 | C5 ASJB | 0.151 | 2.3% | 2.747 |
| 14 | C5 ASC | 0.131 | 1.7% | 2.071 |
| 15 | C5 CF | -0.079 | 0.6% | 0.736 |
| 16 | C5 SE | -0.129 | 1.7% | 1.999 |
| 17 | C5 PL | 0.051 | 0.3% | 0.303 |
| 18 | C5 CCC | 0.038 | 0.1% | 0.170 |
| 19 | C5 HSJB | 0.043 | 0.2% | 0.218 |
| 20 | C5 CB | -0.090 | 0.8% | 0.966 |
| | Total | | 14.4% | |

Appendix H

## Multiple Regression

p≤.05

| Count: | r | r^r | Adj. r^r | RMS Residual: |
|---|---|---|---|---|
| 122 | 0.486 | 0.237 | 0.067 | 15.039 |

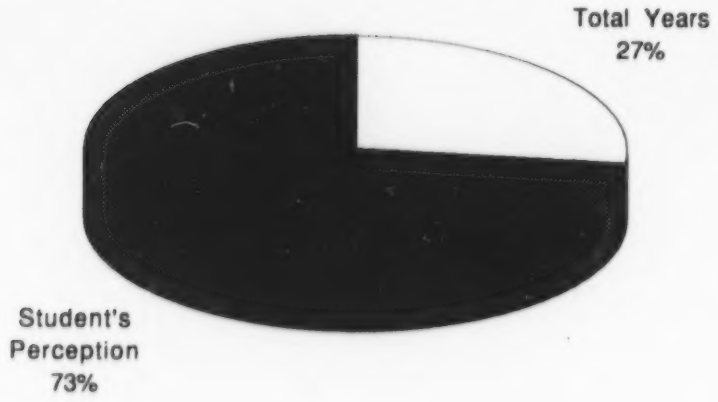
### Analysis of Variance Table

| Source | DF: | Sum Squares: | Mean Square: | F-test: |
|---|---|---|---|---|
| REGRESSION | 22 | 6936.915 | 315.314 | 1.394 |
| RESIDUAL | 99 | 22392.208 | 226.184 | p = .1363 |
| TOTAL | 121 | 29329.123 | | |

### Beta Coefficient Table

| | Variable: | Coefficient: | Std. Err.: | Std. Coeff.: | t-Value: | Probability: |
|---|---|---|---|---|---|---|
| | INTERCEPT | 143.01 | | | | |
| **Years of Participation** | | | | | | |
| 1 | C4 ASB | 0.154 | 0.81 | 0.02 | 0.19 | .85 |
| 2 | C4 ASO | -0.06 | 0.77 | -0.01 | 0.07 | .94 |
| 3 | C4 ASJB | -0.38 | 0.91 | -0.05 | 0.42 | .68 |
| 4 | C4 ASC | 0.03 | 1.06 | 0.00 | 0.02 | .98 |
| 5 | C4 CF | -0.09 | 1.18 | -0.01 | 0.07 | .94 |
| 6 | C4 SE | -1.99 | 2.12 | -0.19 | 0.94 | .35 |
| 7 | C4 SE | 0.34 | 2.02 | 0.03 | 0.17 | .87 |
| 8 | C4 MC | 0.15 | 0.81 | 0.02 | 0.19 | .85 |
| 9 | C4 PL | -0.06 | 0.77 | -0.01 | 0.07 | .94 |
| 10 | C4 CCC | -0.38 | 0.91 | -0.05 | 0.42 | .68 |
| 11 | C4 HSJB | 0.03 | 1.06 | 0.00 | 0.02 | .98 |
| 12 | C4 CB | -0.09 | 1.18 | -0.01 | 0.07 | .94 |
| **Student's Rating** | | | | | | |
| 13 | C5 ASB | -1.99 | 2.12 | -0.19 | 0.94 | .35 |
| 14 | C5 ASO | 0.34 | 2.02 | 0.03 | 0.17 | .87 |
| 15 | C5 ASJB | 1.13 | 2.51 | 0.12 | 0.45 | .65 |
| 16 | C5 ASC | 2.34 | 2.44 | 0.24 | 0.96 | .34 |
| 17 | C5 CF | -1.33 | 1.80 | -0.10 | 0.74 | .46 |
| 18 | C5 SE | -2.09 | 2.14 | -0.11 | 0.97 | .33 |
| 19 | C5 MC | -2.77 | 1.59 | -0.23 | 1.75 | .08 |
| 20 | C5 PL | 2.16 | 2.37 | 0.10 | 0.91 | .37 |
| 21 | C5 CCC | 1.09 | 1.82 | 0.09 | 0.60 | .55 |
| 22 | C5 HSJB | 0.25 | 1.87 | 0.02 | 0.13 | .90 |
| 23 | C5 CB | -2.42 | 1.66 | -0.20 | 1.46 | .15 |

**Pearson Product Moment Correlation**




**Guttman's Partial Correlation**